

Effects of Calcaneal Taping, Sham Taping and Stretching Exercises in Short Term Management of Pain in Plantar Fasciitis

Khurram Sarfraz¹, Fahad Tanveer², Maryam Shabbir³, Shahid Imran⁴, Sunaina Munir⁵, Riaz Hashmi⁶

ABSTRACT

OBJECTIVES: To determine the effects of calcaneal taping, sham taping and stretching exercises in short term management of pain in plantar fasciitis.

STUDY DESIGN: Randomized Clinical Trial, single factor, pretest/post-test study

PLACE AND DURATION: Gymnasiums and Physicians' Clinics from 1st June 2016 to 30th December 2016.

METHODOLOGY: The sample size of 75 patients was collected through convenience sampling technique divided into three groups i.e. Group 1, stretching alone, Group 2, calcaneal taping and Group 3, sham taping. Improvement in Pain and functional limitations were outcomes of study. Visual Analogue Scale [VAS] and Patient Specific Functional Scale [PSFS] were used as outcomes measures.

RESULTS: Mean difference at pre-treatment and first post treatment assessment, pre-treatment and second post treatment assessments. Result showed within group comparison at post treatment status and Assessment status at two levels post intervention for total score of patient specific function scale of patients stretching, calcaneal and sham taping scores. All levels were statistically significantly different towards improvement (p=0.000 and 0.001 respectively). Stretching Group mean was 4.44±1.231 while analyzing within groups statistics, the mean score of Numbering Rating Scale was 6.00±1.21) at pre-treatment assessment and 2.23±0.85) at post treatment assessment.

CONCLUSION: There was no significant difference in terms of pain and dysfunction improvement among Calcaneal Taping, Stretching Technique and Sham Taping to relieve plantar fasciitis.

KEYWORDS: Calcaneal Taping, Sham Taping, Plantar Fasciitis, Plantar Fascia Stretch

HOW TO CITE THIS:

Sarfraz K, Tanveer F, Shabbir M, Imran S, Munir S, Hashmi R. Effects of Calcaneal Taping, Sham Taping and Stretching Exercises in Short Term Management of Pain in Plantar Fasciitis. *Isra Med J.* 2017; 9(5): 309-13.

This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Heel and foot pain is most commonly caused by plantar fasciitis 1, 2 only in America it affects up to two million people every year.^{1,2} It has been classified as an overuse syndrome that results in micro-traumas or tears of plantar fascia.^{3,4} Therefore, similar

to that of epicondylitis, plantar fasciitis must be related to plantar heel pain^{5,6}

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^{7,8}

Usually excessive eversion is considered risk factor for causing plantar fasciitis and excessive eversion is resulted 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 lead to collapse of arch and increased stress on plantar fascia^{9,10}

In a study, non-surgical treatments have been found pain relieving in about 89% of this study's subjects. The study concluded stretching as the easiest technique to relieve plantar fasciitis pain and found stretching of Achilles tendon and plantar fascia in combination been proving more beneficial if applied 3 to 5 times daily^{11,12} Taping found useful in both acute and chronic stage, before or after orthotics. In context of reducing pain, low-Dye technique of taping treatment have been found beneficial by providing support to medial arch. Low-Dye taping technique

1. Physical Therapist
Ali Hospital, Lahore
2. Assistant Professor
University Institute of Physical Therapy, University of Lahore
3. Assistant Professor
Riphah International University, Lahore
4. Physical Therapist
The Children Hospital and the Institute of Child Health, Lahore
5. Assistant Professor
University of Management and Technology, Lahore
6. HOD
Syed Medical Complex, Sialkot

Correspondence to:

Fahad Tanveer
Assistant Professor of
University Institute of Physical Therapy, University of Lahore
Email: fahadtanveer3.pt@gmail.com

Received for Publication: 28-02-17

Accepted for Publication: 31-10-17

used by Holmes resulted in pain reduction of plantar heel pain. While Ernst also found result of taping in favor of reducing pain¹³.
¹⁴ The aim of the study was to determine the effects of calcaneal taping, sham taping and stretching exercises in short term management of pain in plantar fasciitis.

METHODOLOGY

It was an Experimental Randomized Controlled Trial, single factor, pretest/post-test study. Data of seventy five subjects were gathered from gymnasiums and physicians' clinics nearby Mughal Pura, Lahore, through convenience sampling from 1st June 2016 to 30th December 2016. Inclusion criteria were 15 to 50 years of age, pain with first steps upon awaking in morning, equal or more than 3 on Visual Analogue Scale upon, pain in heel or in plantar fascia of mid-foot and calcaneal eversion greater than 2^o. Exclusion criteria were 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. Subjects were equally distributed to three groups with use of dice roll method of randomization. Group classification were such as Group 1, stretching alone, Group 2, calcaneal taping, and Group 3, sham taping. All potential participants of study were screened for following information before randomization such as age, plantar fasciitis pain through Patient specific Functional Scale (PSFS) on Visual Analogue Scale (VAS), pain location, trigger point and medical history.

A questionnaire regarding demographic information, Visual Analogue Scale (VAS) for pain measurement, self-related functional limitations through Patient specific Functional Scale (PSFS) and primary group intervention. All participants were treated individually without knowing each other's treatment time, details and identity. Subjects in three groups were blinded from other group options, especially group with calcaneal taping and sham taping were blinded, however, were instructed to report any adverse effects during trial. Assessors were recruited senior physical therapists well aware with outcome measurements used in study. The therapists providing the treatment were possibly not be blinded, firstly due to apparent different interventional procedures.

As there were three groups in this trial. The details of group interventions were as follows Group 1, the Stretching Group was provided with passive stretch of plantar flexors and plantar fascia. Soleus muscle was stretch with knee bent, and gastrocnemius with knee extended. Overpressure was given at end of each passive stretch, combined with passive stretch of big toe flexors extending stretch to plantar fascia. Participants in Group 1 were instructed not to perform these stretching exercises at home. Group 2, Calcaneal Taping alone The Cover-Roll stretch bandage was applied that were followed by application of Leuko-tape 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 behind calcaneus. It's anchors were applied just distal to medial malleolus. Group 3, the Sham Taping Group This group was applied taping without addressing and maintaining ankle, foot and calcaneus biomechanics. Improvement in Pain and functional limitations were outcomes of study. Visual Analogue Scale [VAS] and Patient Specific Functional Scale [PSFS] were used as outcomes measures. VAS is a line having anchors at 0 indicating no pain and 10, indicating worst experienced pain. The subjects were asked to point anywhere on spectrum, their foot pain in morning in first few steps. Other outcome measure was PFSF in which the subjects were asked to report any 3 difficulties they face due to foot pain. These activities will further then be asked to rate on a 0, indicating inability to perform activity and 10, the ability to perform activity in its actual shape.

Operational Definitions: Stretching Alone: Stretching is a form of physical exercise in which a specific muscle or tendon (or muscle group) is deliberately flexed or stretched in order to improve the muscle's felt elasticity and achieve comfortable muscle tone. The result is a feeling of increased muscle control, flexibility, and range of motion. Stretching is also used therapeutically to alleviate cramps.

Sham Taping: Deloading tape reduces muscle stress at rest and during contraction.

Calcaneal Taping: The calcaneus tape provides stability and mobility of the foot and its arches.

RESULTS

The descriptive statistics and repeated measure ANOVA was applied for between group analysis and one way ANOVA for within group analysis. Result shows within group comparison at Pre Treatment status and post intervention for Disability Scores of patients taking zero manual therapy sessions. All levels were statistically significantly different towards improvement (p-0.001 and 0.001 respectively). Mean difference at pre-treatment and first post treatment assessment, pre-treatment and second post treatment assessments.

Result shows within group comparison at post Treatment status and Assessment status at two levels post intervention for total score of patient specific function scale of patients stretching, calcaneal and sham taping scores. All levels were statistically significantly different towards improvement (p-0.000 and 0.001 respectively).

Results showed that in Stretching Group mean was 4.4400 (SD±1.231 while analyzing within groups statistics, the mean score of Numbering Rating Scale was 6.000 (SD±1.231) at pre-treatment assessment and 2.233(SD±0.858) at post treatment assessment.

TABLE - I: POST THERAPY-PATIENT SPECIFIC FUNCTIONAL SCALE (N=75)

Multiple Comparisons						
POST THERAPY-PATIENT SPECIFIC FUNCTIONAL SCALE: post Functional Activity 1 LSD						
(I) Study Groups	(J) Study Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Stretching Group	Calcaneal Taping	-2.52000*	.41419	.000	-3.3457	-1.6943
	Sham Taping	1.84000*	.41419	.000	1.0143	2.6657
Calcaneal Taping	Stretching Group	2.52000*	.41419	.000	1.6943	3.3457
	Sham Taping	4.36000*	.41419	.000	3.5343	5.1857
Sham Taping	Stretching Group	-1.84000*	.41419	.000	-2.6657	-1.0143
	Calcaneal Taping	-4.36000*	.41419	.000	-5.1857	-3.5343

*. The mean difference is significant at the 0.05 level.

TABLE II: PRE AND POST THERAPY-PATIENT SPECIFIC FUNCTIONAL SCALE (N=75)

Multiple Comparisons							
Dependent Variable	(I) Study Groups	(J) Study Groups	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
POST THERAPY-PATIENT SPECIFIC FUNCTIONAL SCALE: post Functional Activity 1	Stretching Group	Calcaneal Taping	-2.52000*	.41419	.000	-3.3457	-1.6943
		Sham Taping	1.84000*	.41419	.000	1.0143	2.6657
	Calcaneal Taping	Stretching Group	2.52000*	.41419	.000	1.6943	3.3457
		Sham Taping	4.36000*	.41419	.000	3.5343	5.1857
	Sham Taping	Stretching Group	-1.84000*	.41419	.000	-2.6657	-1.0143
		Calcaneal Taping	-4.36000*	.41419	.000	-5.1857	-3.5343
PRE-THERAPYPATIENT SPECIFIC FUNCTIONAL SCALE: pre Functional Activity 2	Stretching Group	Calcaneal Taping	.16000	.28597	.578	-.4101	.7301
		Sham Taping	.12000	.28597	.676	-.4501	.6901
	Calcaneal Taping	Stretching Group	-.16000	.28597	.578	-.7301	.4101
		Sham Taping	-.04000	.28597	.889	-.6101	.5301
	Sham Taping	Stretching Group	-.12000	.28597	.676	-.6901	.4501
		Calcaneal Taping	.04000	.28597	.889	-.5301	.6101
POST THERAPY-PATIENT SPECIFIC FUNCTIONAL SCALE:post Functional Activity 3	Stretching Group	Calcaneal Taping	-1.52000*	.30007	.000	-2.1182	-.9218
		Sham Taping	3.28000*	.30007	.000	2.6818	3.8782
	Calcaneal Taping	Stretching Group	1.52000*	.30007	.000	.9218	2.1182
		Sham Taping	4.80000*	.30007	.000	4.2018	5.3982
	Sham Taping	Stretching Group	-3.28000*	.30007	.000	-3.8782	-2.6818
		Calcaneal Taping	-4.80000*	.30007	.000	-5.3982	-4.2018

TABLE III: POST THERAPY SCORE (N=75)

POST THERAPY-Total Score: Sum of Activity Scores/ Number of Activities	Stretching Group	Calcaneal Taping	-5.44000*	.62361	.000	-6.6831	-4.1969
		Sham Taping	7.52000*	.62361	.000	6.2769	8.7631
	Calcaneal Taping	Stretching Group	5.44000*	.62361	.000	4.1969	6.6831
		Sham Taping	12.96000*	.62361	.000	11.7169	14.2031
	Sham Taping	Stretching Group	-7.52000*	.62361	.000	-8.7631	-6.2769
		Calcaneal Taping	-12.96000*	.62361	.000	-14.2031	-11.7169

TABLE IV: PATIENT SPECIFIC FUNCTIONAL SCORE AT POST THERAPY (N=75)

PSFS Post Therapy Score Across All Activities	Stretching Group	Calcaneal Taping	-1.81333*	.20787	.000	-2.2277	-1.3990
		Sham Taping	2.50667*	.20787	.000	2.0923	2.9210
	Calcaneal Taping	Stretching Group	1.81333*	.20787	.000	1.3990	2.2277
		Sham Taping	4.32000*	.20787	.000	3.9056	4.7344
	Sham Taping	Stretching Group	-2.50667*	.20787	.000	-2.9210	-2.0923
		Calcaneal Taping	-4.32000*	.20787	.000	-4.7344	-3.9056

*. The mean difference is significant at the 0.05 level.

TABLE V: POST TREATMENT-VISUAL ANALOGUE SCALE (N=75)

Descriptive								
Post Treatment-VISUAL ANALOGUE SCALE								
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Stretching Group	25	4.4400	1.73397	.34679	3.7243	5.1557	3.00	10.00
Calcaneal Taping	25	1.8000	1.52753	.30551	1.1695	2.4305	.00	7.00
Sham Taping	25	6.6400	1.38082	.27616	6.0700	7.2100	4.00	9.00
Total	75	4.2933	2.51360	.29025	3.7150	4.8717	.00	10.00

TABLE VI: POST TREATMENT-VISUAL ANALOGUE SCALE LSD (N=75)

Post Treatment-VISUAL ANALOGUE SCALE LSD				
(I) Study Groups	(J) Study Groups	Mean Difference (I-J)	Std. Error	Sig.
Stretching Group	Calcaneal Taping	2.64000*	.43960	.000
	Sham Taping	-2.20000*	.43960	.000
Calcaneal Taping	Stretching Group	-2.64000*	.43960	.000
	Sham Taping	-4.84000*	.43960	.000
Sham Taping	Stretching Group	2.20000*	.43960	.000
	Calcaneal Taping	4.84000*	.43960	.000

*. The mean difference is significant at the 0.05 level.

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 countries 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. 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.

Current study however suggests calcaneal taping is the best of all and patient can be put home plan for exercises. Literature supports, however, calcaneal taping. Manual therapy, to some extent, involves stretching tissue beyond normal tissue, and carries many harmful aspects. Literature supports therapeutic exercise at priority and only that essential manual therapy session. In this regard, a systematic review concluded different ways of treatment in case of different types of plantar fasciitis. 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, lesser 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.

The study conducted by investigated to examine the effect of KT on gastrocnemius surface electromyography (SEMG) activity and ankle range of motion during walking in healthy subjects. KT does significantly shorten the duration of the LG activity during gait when applied 72 h in healthy adults. However, this result was not accompanied by a significant reduction in the amplitude of LG SEMG activity.¹⁵

Another study conducted by investigated to determine if taping techniques effectively support the arch during exercise. Both taping techniques effectively changed plantar pressures in the lateral midfoot, and these changes were sustained throughout the 15 minutes of exercise.¹⁶

The study conducted by examined how the application of Low-Dye (LD) taping affected the pain and stability of patients with plantar fasciitis. Utilizing Low-Dye taping for patients with plantar fasciitis appears to be an effective intervention method for reducing pain and enhancing stability.¹⁷

Another study conducted by determined that Kinesio Taping was more effective than a sham taping/placebo, no treatment or other interventions in people with musculoskeletal conditions. This review provides the most updated evidence on the effectiveness of the Kinesio Taping for musculoskeletal conditions. The current evidence does not support the use of this intervention in these clinical populations.¹⁸

The study conducted by demonstrated the relationship

between the restrictions of ankle taping and performance of an instep kick in soccer. Plantar-flexion-limiting taping at 30° has a potential to prevent posterior ankle impingement without decreasing the ball velocity generated by soccer instep kicks.¹⁹ Another study conducted by investigated the influence of a KT application directed at the ankle joint on measures of corticospinal excitability with transcranial magnetic stimulation. Our results concur with other recent reports, showing KT applications have little influence at the neuromuscular level. Alterations in sensory feedback ascribed to elastic taping are likely insufficient to modulate corticospinal excitability in a functionally meaningful manner.²⁰

CONCLUSION

There was no significant difference in terms of pain and dysfunction improvement among Calcaneal Taping, Stretching Technique and Sham Taping to relieve plantar fasciitis.

CONTRIBUTION OF AUTHORS:

Sarfraz K: Conceived idea, Designed methodology, writing manuscript

Tanveer F: Final approval of the article, Data Collection, Statistical analysis

Shabbir M: Analysis and interpretation Critical revision of the article

Munir S: Critical revision of the article

Imran S: Manuscript writing, Data collection

Hashmi R: Statistical analysis

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

REFERENCES

1. Van de Water AT, Speksnijder CM. Efficacy of taping for the treatment of plantar fasciosis: a systematic review of controlled trials. *J of Am Podiatric Med Asso* 2010; 100(1): 41-51
2. Rougier P, Genthon N, Gallois-Montbrun T, Brugière S, Bouvat E. One- or two-legged standing: what is the more suitable protocol to assess the postural effects of the rigid ankle orthosis. *Res Quarterly for Exer & Sport*. 2009; 80(4): 702-709.
3. Adams E, Madden C. Cuboid subluxation: a case study and review of the literature. *Current Sports Med Reports*. 2009; 8(6): 300-307.
4. Delahunt E, O'Driscoll J, Moran K. Effects of taping and exercise on ankle joint movement in subjects with chronic ankle instability: a preliminary investigation. *Archives of Physical Med & Rehab*. 2009; 90(8): 1418-22
5. Nolan D, Kennedy N. Effects of low-dye taping on plantar pressure pre and post exercise: an exploratory study. *BMC Musculoskeletal Disorders*. 2009; 10(1): 40.
6. Costa IA, Dyson A. The integration of acetic acid iontophoresis, orthotic therapy and physical rehabilitation for chronic plantar fasciitis: a case study. *J of the Canadian Chiropractic Asso* 2007; 51(3): 166.
7. De Ridder R, Willems T, Vanrenterghem J, Roosen P. Effect of tape on dynamic postural stability in subjects with chronic ankle instability. *Int J of Sports Med*. 2015; 36(04): 321-26.
8. Griebert MC, Needle AR, McConnell J, Kaminski TW. Lower-leg Kinesio tape reduces rate of loading in participants with medial tibial stress syndrome. *Physical Ther in Sport*. 2016; 18: 62-67.
9. Ho Y-H, Lin C-F, Chang C-H, Wu H-W. Effect of ankle kinesio taping on vertical jump with run-up and countermovement jump in athletes with ankle functional instability. *J. of Physical Ther Sci*. 2015; 27(7): 2087-90.
10. Hopper DM, Grisbrook TL, Finucane M, Nosaka K. Effect of ankle taping on angle and force matching and strength of the plantar flexors. *Physical Ther in Sport*. 2014; 15(4): 254-60.
11. Karadag-Saygi E, Cubukcu-Aydoseli K, Kablan N, Ofluoglu D. The role of kinesiotaping combined with botulinum toxin to reduce plantar flexors spasticity after stroke. *Topics in Stroke Rehab*. 2010; 17(4): 318-22.
12. Kelly LA, Racinais S, Tanner CM, Grantham J, Chalabi H. Augmented low dye taping changes muscle activation patterns and plantar pressure during treadmill running. *J. of Orthopaedic & Sports Physical Ther* 2010; 40(10): 648-55.
13. Kobayashi T, Saka M, Suzuki E, Yamazaki N, Suzukawa M, Akaike A, et al. The effects of a semi-rigid brace or taping on talocrural and subtalar kinematics in chronic ankle instability. *Foot & Ankle Speci* 2014; 7(6): 471-77.
14. Lee J-h, Yoo W-g. Treatment of chronic Achilles tendon pain by Kinesio taping in an amateur badminton player. *Physical Ther in Sport*. 2012; 13(2): 115-19.
15. Martínez-Gramage J, Merino-Ramirez M, Amer-Cuenca J, Lisón J. Effect of Kinesio Taping on gastrocnemius activity and ankle range of movement during gait in healthy adults: a randomized controlled trial. *Physical Ther in Sport*. 2016; 18: 56-61.
16. Newell T, Simon J, Docherty CL. Arch-taping techniques for altering navicular height and plantar pressures during activity. *J of Athletic Training*. 2015; 50(8): 825-32.
17. Park C, Lee S, Lim D-y, Yi C-W, Kim JH, Jeon C. Effects of the application of Low-Dye taping on the pain and stability of patients with plantar fasciitis. *J of Physical Ther Sci*. 2015; 27(8): 2491-93.
18. Parreira PdCS, Costa LdCM, Junior LCH, Lopes AD, Costa LOP. Current evidence does not support the use of Kinesio Taping in clinical practice: a systematic review. *J of Physiotherapy*. 2014; 60(1): 31-39.
19. Sasadai J, Urabe Y, Maeda N, Shinohara H, Fujii E. The Effect of Ankle Taping to Restrict Plantar Flexion on Ball and Foot Velocity during an Instep Kick in Soccer. *J of Sport Rehab*. 2015; 24(3): 261-67.
20. Tremblay F, Karam S. Kinesio-taping application and corticospinal excitability at the ankle joint. *J of Athletic Training*. 2015; 50(8): 840-46.