

Short Term Effect Of Kinesio Taping On Functional Disability And Quality Of Life In Treatment Of Patients With Planter Fasciitis: A Randomized Controlled Clinical Trial

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ABSTRACT

Background: plantar fasciitis (PF) is one of the most common foot pathologies, its affects 10% of population, and contributed with heel pain, falls, poor quality of life, and disability.

Objective of the study: this study aimed to show the short term effect of kinesio taping on functional disability and quality of life in treatment of patients with planter fasciitis.

Subjects and Methods: A total of 30 patients with plantar fasciitis were enrolled from a single center and randomized into KT and Control treatment groups in a 1:1 ratio (i.e., 15 patients in each group); only one foot was considered for each patient. KT was applied once a week for 4 weeks. Patients pain, functional status and quality of life were evaluated with the visual analog scale (VAS), the Short-Form-36 (SF-36) and foot and ankle outcome score (FAOS) health survey. All evaluations were performed before and immediately after the 4-weeks intervention.

Rustles: the multiple pair wise comparison tests was used to compare between pre and post treatment in both groups, and it revealed that there is a significant reduction ($p < 0.05$) in VAS-pain and significant increase ($p < 0.05$) in FASO and SF-36 Quality of life in favor to KT group compared to control group After 4 weeks of treatment.

Conclusion: Our findings show that utilizing kinesio tape for one month of therapy can improve function, quality of life, and reduce discomfort or pain in patients with plantar fasciitis.

Keywords: kinesio tape, plantar fasciitis, Quality of life, functional disability, fascia Tape.

INTRODUCTION

Plantar fasciitis (PF) is one of the most common foot pathologies and affects approximately 10% of the population throughout their life. ^[1] It is higher in women than men. ^[2] Annually is estimated to account for over 1 million physician visits in the United States. ^[3]

Plantar fasciitis (PF) contributed with heel pain, falls, poor quality of life, and disability. Clinically, Individuals with plantar fasciitis report difficulties in, walking-related activities and, to a lesser extent. They commonly complain of pain in the inferior part of the heel, which is worse first thing in the morning or after long periods of inactivity. ^[4]

Although it was described as an inflammatory condition, recent research indicates that plantar fasciitis (PF) is more likely to be a degenerative pathology with a multi factorial etiology.^[1]

The plantar fascia is a thick band of connective tissue that runs along the bottom of the foot and supports the arch. It was made up of three parts: a thick central component and thinner medial and lateral components. The plantar fascia helps to maintain the longitudinal arch and provides a windlass effect on the sole of the foot. It connects proximally to the medial tubercle of the calcaneus and extends distally into five digital bands that insert into the base of the periosteum of each toe proximal phalanx and the metatarsal heads.^[5]

Moreover, current understanding is that (PF) occurs through a degenerative rather than an inflammatory process, that is, a “fasciosis,” rather than a fasciitis, where tensile strain is the key feature in the pathogenesis. Particularly, the increased fascial load is sensed by the gap junctions between fibrocytes (mechanotransduction), which then mediate changes in the extracellular matrix, resulting in myxoid degeneration and fragmentation of the plantar fascia and perifascial structures.^[6]

Conservative therapeutic interventions for PF include activity modification, ice massage, stretching exercises, orthotics, oral analgesics, and corticosteroid injections. Other treatment options for chronic plantar fasciitis include extracorporeal shockwave therapy (ESWT), ultrasound therapy (UST), and low-level laser therapy (LLLT).^[1]

Most treatments endeavor to resolve the symptoms caused by plantar fasciitis; whereas orthotics and taping aim to correct the foot's biomechanics.^[7]

Taping is commonly used to treat plantar fasciitis, particularly for palliative management of early pathological stages of heel pain. Taping the foot could improve poor biomechanics and take the strain off

the plantar fascia.^[8] Kinesio-Taping (KT) has been increasingly used in the conservative management of musculoskeletal disorders. (Dr. Kenzo Kase) was the first to develop it. The texture and elasticity of Kinesio tape differ from that of conventional tapes. It is air-permeable, water-resistant, and longitudinally stretchable up to 40% of its resting length.^[4] These features allow for multiple day wear and a constant pulling force on the skin. This pulling force to the skin on which kinesio tape is applied is thought to improve blood and lymphatic circulation, resulting in pain and edema relief, as well as proprioceptive facilitation and muscle relaxation.^[9]

Various heel taping techniques have been suggested: low-dye taping (LDT), high dye taping, calcaneal taping, windlass taping and plantar fasciitis taping.^[7] The fascia taping manner reduces maximal strain on the fascial band and enhances navicular height slightly in the stance phase of gait.^[8]

Wherefore, in present study we hypothesized that kinesio tape (fascia tape) method has a short-term effect on functional disability and quality of life in treatment of patients with planter fasciitis.

Objective of the study:

This study aimed to show the short term effect of kinesio taping on functional disability and quality of life in treatment of patients with planter fasciitis

SUBJECTS AND METHODS

Study design:

This study was a parallel group randomized controlled trial. It was conducted in accordance with the principles of the Declaration of Helsinki. Study protocol was approved by the Ethics Committee of

Faculty of physical therapy, Cairo University, Cairo, Egypt (approval number: P.T.REC/012/004026), The research was carried out in the physical therapy department of Saudi German Hospital Aseer region, Abha, Saudi Arabia.

Subjects:

For the Trial, A total of 44 subjects were evaluated for participation. As a result of not meeting the study criteria, 4 of them were respectively excluded, 10 subjects were lost of follow-up, Thus, thirty subject (n=30) 26 female and 4 male were enrolled

to the trial. We included subjects who had previously been diagnosed with planter fasciitis (PF), who experienced pain when the medial tuberosity of the calcaneus was palpated. The subjects' ages ranged from 23 to 70 years old, and they presented with pain during the initial steps that lessened after a few steps but was aggravated by increased activity. Additionally, we disqualified those with recent steroid injections, history of ankle or foot surgery, inflammatory rheumatoid arthritis history, and radiculopathy. Figure (1):

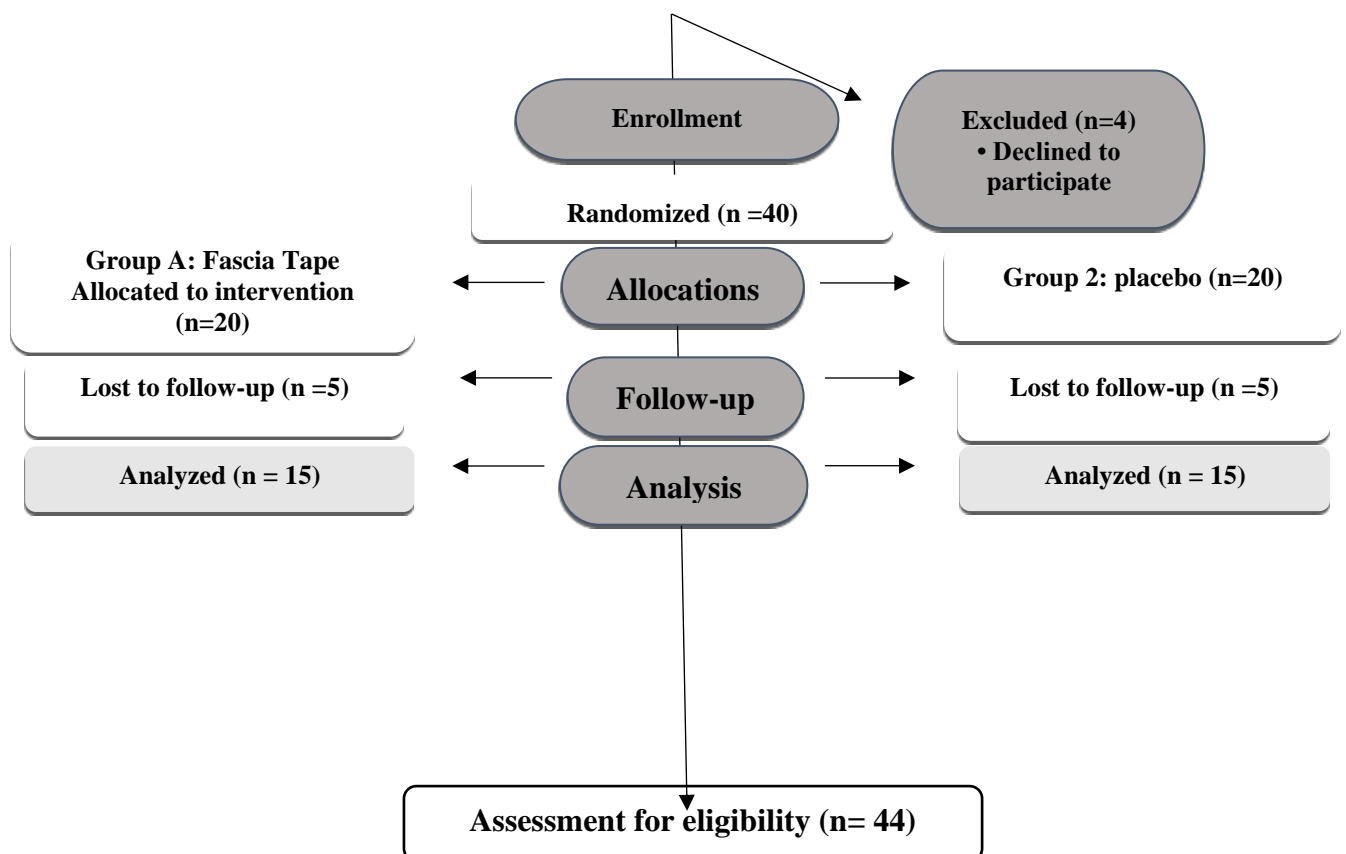


Figure (1): participant flow diagram

Randomization:

All eligible patients who provided consent for participation were randomly assigned to either group by the primary researcher in a 1:1 ratio. The subjects was divided randomly into two groups first one (group

A) reserve intervention which is kinesio Tape second group (group B) controlled.

Outcome measurements:

Both groups (A) and (B) used a visual analog scale (VAS) to assess pain severity. The VAS is a valid, responsive, and widely

used pain outcome measure. ^[10] We have been using the foot and ankle outcome score (FAOS) to assess function and quality of life. ^[11] The FAOS is a reliable and valid questionnaire for evaluating foot and ankle symptoms and functional limitations. It includes a 42-item questionnaire divided into five subscales: pain, other symptoms, daily activities, sports and recreation function, and foot and ankle-related quality of life. ^[12] Additionally, the (SF-36) score, a general health status survey was used to evaluate eight domains of health-related quality of life (QoL), before and after the intervention every subject received an evaluation. ^[13]

Intervention:

Fascia Tape group (Group A)

Standard 2" (5 cm) WeTape®- kinesiology tape (BB TAPE, WETAPE Inc., Paju, Korea) was used. Fascia tape was applied

to the plantar fascia and it remained on the patient for 3 days. It was applied once a week for 4 weeks. During the taping, the patient was in a prone position with the ankle joints in a neutral position. With the toes extended against the bed or ground Figure (2-A). The taping was marked on the Achilles tendon. It was cut longitudinally into five slices of equal width. Figure (2-B). It applied to the forefoot by stretching it by 25% Figure (2-C). Finally, the last strap was applied with gentle compression across the bases of the five slices beneath the foot and wrapped around the rear foot. Dashed arrows denote the direction of stretch. ^[14] [Figure (2-D).

Control group (group B)

For the placebo group, the initial evaluation was done in week 1 and was followed by a reassessment in week 4 without any further treatment.

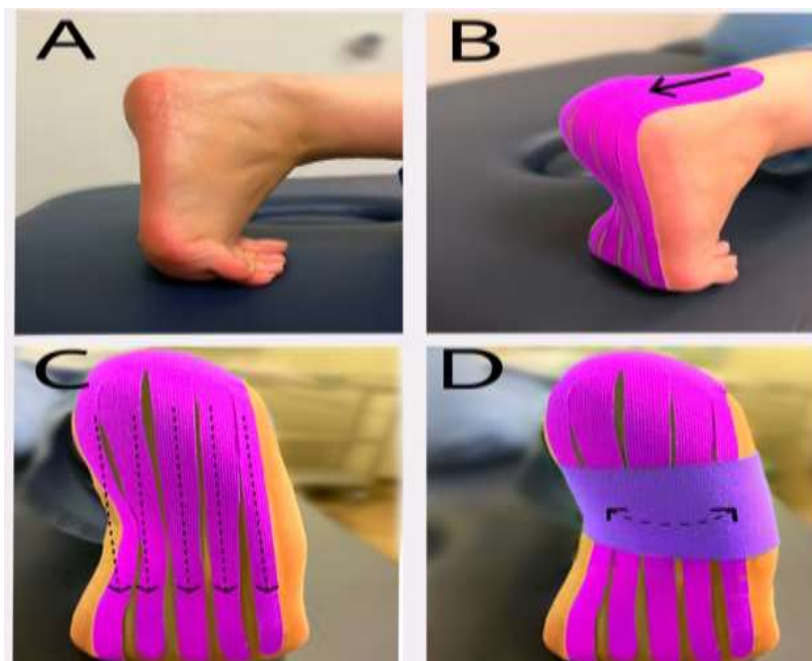


Figure 2 (A, B, C, D): Kinesio tape application.

STATISTICAL ANALYSIS

The Statistical Package for Social Science (SPSS) software version 23 for Windows

was used for all statistical analyses. Covariance homogeneity and data normality are tested using the Box's test and the Shapiro-Wilk test, respectively. 2x 2 mixed design MANOVA was used to compare the tested variables of interest in different test groups and measurement times. The alpha level was set at 0.05.

RESULTS

Mixed design MANOVA revealed that there were significant within- subject effect and treatment*time effect ($F= 3808.421$, $p = 0.0001$, Partial Eta Squared=1.00) ($F= 3808.421$, $p = 0.0001$, Partial Eta Squared=1.00) respectively. Also, there was significant between- subject effect ($F= 248.423$, $p = 0.0001^*$, Partial Eta Squared=0.998). The descriptive statistics

of within and between groups differences at 95%CI for the effects of interventions for all dependent variables were presented in table (1). Concerning to the within subject effect, the multiple pair wise comparison tests was used to compare between pre and post treatment in both groups, and it revealed that there is a significant reduction ($p<0.05$) in VAS-pain and significant increase ($p <0.05$) in FASO which include (Symptoms stiffness, Function daily living, Sport recreation activities, Quality of life subtotal) and SF-36 Quality of life (Physical functioning, Role limitation on due to physical health, Role limitation on due to emotional problem, Energy fatigue, Emotional wellbeing, Social function, Pain level and General health) in favor to group A compared to group B.

Table (1): Descriptive and Inferential Statistics of the Dependent Variables in the Experimental and Control Groups Pre and Post the 4 Weeks

		Group (A) (n = 15)	Group (B) (n = 15)	P value*
1- VAS	Pre training	7.26 ± 0.79	7.53 ± 0.63	0.322 NS
	Post training	2.6 ± 1.29	7.53 ± 0.63	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
2- FASO	Pre training	51.46± 9.92	55.06 ± 10.89	0.352 NS
	Post training	86.6± 7.73	55.06 ± 1089	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
2.a Symptoms stiffness	Pre training	71.13 ± 12.58	69.33 ± 12.97	0.703 NS
	Post training	93.73 ± 4.99	69.33 ± 12.97	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
2.b Pain subscale	Pre training	36.8± 2.65	37.06± 2.84	0.792 NS

	Post training	79.46 ± 8.46	37.06 ± 2.84	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
2.c Function daily living	Pre training	51.13 ± 6.32	49.86 ± 5.46	0.567 ^{NS}
	Post training	88.6 ± 6.6	49.86 ± 5.46	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
2.d Sport recreation activities	Pre training	47.6± 8.15	47.53 ± 6.74	0.981 ^{NS}
	Post training	80.26± 10.15	47.53 ± 6.74	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
2.e Quality of life subtotal	Pre training	40 ± 4.01	39.66 ± 3.81	0.817 ^{NS}
	Post training	87.2 ± 7.93	39.66 ± 3.81	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
3- 36-SF 3.a Physical functioning	Pre training	39.26 ± 4.52	39.33 ± 4.54	0.968 ^{NS}
	Post training	80.06 ± 8.54	39.33± 4.54	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
3.b Role limitation on due to physical health	Pre training	50.13± 3.33	49.33 ± 3.97	0.555 ^{NS}
	Post training	81.06 ± 6.92	49.33 ± 3.97	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
3.c Role limitation on due to emotional problem	Pre training	31.4 ± 2.38	31.4 ± 2.38	1.00 ^{NS}
	Post training	89.2± 2.98	31.4 ± 2.38	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
	Pre training	37.93 ± 4.86	37.93 ± 4.86	1.00 ^{NS}

3.d Energy fatigue	Post training	52.73 ± 3.23	37.93 ± 4.86	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
3.e Emotional wellbeing	Pre training	59.53 ± 3.46	59.26 ± 3.57	0.837 ^{NS}
	Post training	77 ± 3.16	59.26 ± 3.57	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
3.f Social function	Pre training	32.53 ± 4.03	32.26 ± 4.39	0.864 ^{NS}
	Post training	79.6 ± 3.92	32.26 ± 4.39	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
3.g Pain level	Pre training	46.2 ± 3.21	45.86 ± 3.04	0.773 ^{NS}
	Post training	81.93 ± 3.63	45.86 ± 3.04	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	
3.h General health	Pre training	42.06 ± 2.18	41.86 ± 2.32	0.81 ^{NS}
	Post training	71.2 ± 5.33	41.86 ± 2.32	0.001 ^S
P value**		0.001 ^S	1.00 ^{NS}	

* Inter-group comparison; ** intra-group comparison of the results pre and post training.

^{NS} P > 0.05 = non-significant, ^S P < 0.05 = significant, P = Probability.

Discussion

In the present study, we investigated the short-term effects of kinesio tape (KT) on functional impairment and quality of life in patients with plantar fasciitis, and we are aware of only a few studies that have investigated this.

Our trial found out after one week of therapy, the experimental group (Group A)

experienced a markedly decreased level of plantar pain. After one month of treatment, there have been noticeable improvements in stiffness, pain sub-scale, function, daily living, sports activities, and quality of life. However, improvement in foot function over the past three weeks has been noted. (Group B) The control group shows no improvement in either function or discomfort.

This finding has been supported by the **Tezel et al., (2020)** study, which compared the effects of extracorporeal shockwave therapy (ESWT) and Kinesio-Tape (KT) in treating plantar fasciitis over 6-week duration and concluded that both Kinesio-Tape and extracorporeal shockwave therapy significantly reduced pain levels, improved quality of life, and highlighted Kinesio-Tape as significantly improving function.^[15]

However, **Kirthika et al., (2018)** discovered that KT has a positive effect on functional performance and dynamic balance in plantar fasciitis patients^[16].

In another study, **Kim et al., (2011)** have shown that a physical therapy tape can support lifting the navicular bone as well as transferring the foot pressure from the medial mid-foot to the lateral mid-foot, alter the foot biomechanics, and reduce pain through six weeks of treatment.^[17]

The improvement can be explained by looking at plantar fasciitis pathology, it is primarily caused by repeated overstrain on the plantar fascia.^[18] During running, the plantar fascia is primarily loaded by tensile strains to accept body weight and absorb impact.^[19] Excessive fascia band strains that occur repeatedly during gait cycles have been linked to tissue microtears, local inflammations, and collagen degeneration.^[5] These changes all contribute to the pathology of plantar fasciitis. Thus, lowering fascial strain might promote healing of damaged tissue and lessen injuries.^[20] And that should lay the mechanical cornerstone for treatment and support the functionality of the plantar fascia.

Mechanically, kinesio tape (KT) has been demonstrated to alleviate pressure and tension on the plantar fascia. However, the elastic kinesio tape (KT) approach provides

mechanical support that allows for a full range of motion.^[14-21] Using tape is recommended as the initial tension-release therapy for overstressed plantar fascia.^[22] Tape application to the foot was advised to rectify poor biomechanics and relieve the pressure on the plantar fascia.^[7] When applying fascia tape, the tape is intended to stabilize the plantar ligaments and minimize aberrant plantar fascia movement by utilizing the arch-raising effects of the foot windlass mechanism.^[14-23]

And that was revealed by the **Chen et al., (2020)** study, which provides quantitative evidence to support the use of taping treatments for overstretched plantar fascia; the untensed fascia band achieved by fascia taping could be a potential indicator of pain relief in running. The study was done on a finite element foot model that included twenty bones, bulk soft tissue, foot muscles, ligaments, and tendons, and a firm plantar fascia part. A runner performed several running trials under one untaped condition and two taped conditions: low-dye taping and fasciae taping, which were implemented by a physiotherapist use the Kinesio tapes. The captured motion data was processed to drive a scaled musculoskeletal model and calculate segmental kinematics. The principal tensile strain on the plantar fascia, subtalar eversion, and navicular height during the stance phase were averaged across five trials of each condition and compared using Friedman's test, and results that In comparison to the non-taping condition, fascia taping significantly reduced maximal strains on the fascia band and increased navicular height.^[8]

There is no study in the literature that involved a single application technique carried out over a 4-week period, as the current study did. In the current trial, a 4-week treatment resulted in a considerable

improvement in both pain and functionality.

When the results of the current study and the previous studies are combined, they confirm each other. [8-15-16-17] suggests that KT can provide a significant improvement in pain, functionality, and QoL without the need for further physical therapy treatment modalities, most likely attributed to supporting foot biomechanics and reducing the strain on the plantar fascia.

4.1- Conclusion

Our findings show that utilizing kinesio tape for 4-weeks of therapy can improve function, quality of life, and reduce discomfort or pain in plantar fasciitis patients. Our research suggests adopting the fascia Tape approach to treat plantar fasciitis. More study, particularly Randomized control trials, is required to determine the long-term effects of taping. Research as well, is suggested to combine Taping with conventional therapeutic techniques.

Acknowledgment

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Ethics Statement:

The study was designed as an experimental randomized controlled clinical trial. The study was examined and approved by the Ethics Committee of Faculty of physical therapy, Cairo University, Cairo, Egypt (approval number: P.T.REC/012/004026), The research was carried out in the Physical Therapy department of Saudi German Hospital Aseer region, Abha, Saudi Arabia. The Helsinki Declaration Criteria for human research were followed in this study. A written informed consent was obtained from each patient.

Authors Contributions:

AMFE took part in the concept and design of the study. RMYA and SAGA contributed to applying each treatment according to the treatment schedule. RMYA and SAGA participated in acquisition of data. AMFE contributed to Data analysis and interpretation. All authors collaborated on the study's statistical analysis, interpretation of the data, writing, and editing.

Disclosure statement:

No authors have any financial interest or received any financial benefit from this research.

Conflict of interest:

Authors state no conflict of interest.

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