ARAŞTIRMA MAKALESİ/ ORIGINAL ARTICLE

Kocaeli Med J 2018; 7; 2:92-97

Plantar Fasiiti Olan Hastalarda Kinesiotaping Uygulamasının Ağrı, Denge Ve Düşme Riski Üzerine Etkisi

The Effect of Kinesiotaping on Pain, Balance and Falling Risks in Patients with Plantar Fasciitis

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ÖZ

GİRİŞ ve AMAÇ: *Plantar fasiit sendromu olan hastalarda kinesiotaping uygulamasının ağrı, denge, düşme riski ve fonksiyonel duruma olan etkisinin araştırılması*

YÖNTEM ve GEREÇLER: *Çalışmaya dahil edilen 30 hasta randomize olarak eşit iki gruba ayrıldı. Her iki gruba egzersiz ve soğuk uygulama yapması önerildi. Tedavi grubuna ayak-topuk bölgesine kinesiotaping bantlama, kontrol grubuna ise aynı bölgeye yalancı bantlama yapıldı. Hastalar müdahale öncesi ve 1 hafta sonrasında değerlendirildi. Çalışmamızda hastaların ağrıları vizüel analog skala (VAS) ile değerlendirildi. Ayak Fonksiyon İndeksi (AFİ), Nottingham Sağlık Profili doldurduldu ve denge-düşme riski değerlendirmesi için Biodex Balance sistemi ile ölçümleri yapıldı.*

BULGULAR: *Her iki grupta da VAS değerlerinde azalma oldu ancak gruplar arası istatistiksel olarak anlamlı fark bulunmadı. Fonksiyonel karşılaştırmada AFİ-Yetersizlik skorunda gerçek bantlama lehine istatiksel olarak anlamlı fark saptandı.*

TARTIŞMA ve SONUÇ: *Plantar fasiit sendromu için uygulanan kinesiotaping uygulamasının ağrı üzerine anlamlı etkisinin olduğu, ancak bu etkinin plaseboya göre istatistiksel bir fark oluşturmadığı görülmüştür.*

Anahtar Kelimeler: *Plantar Fasiit, Kinesiotaping, Denge, Düşme Riski, Ağrı*

ABSTRACT

INTRODUCTION: *Investigation of the effect of kinesiotaping on pain, balance, risk of falls and functional status in patients with plantar fasciitis syndrome.*

MATERIAL AND METHODS: *Thrity patients with plantar fasciitis were divided into two groups randomly. Exercise and ice application were suggested to both groups. Kinesiotaping was applied to intervention group and placebo taping was applied to the other group. Patients were evaluated before intervention and one week after the intervention. We used visual analog scale (VAS) for pain evaluation. Foot Function Index (FFI), Nottingham Health Profile were filled and measurements were taken with the Biodex Balance system to assess balance-and-falls risk.*

RESULTS: *There was a decrease in VAS values in both groups but there was no statistically significant difference between the groups. A statistically significant difference was found in treatment group in FFI-Disability score in functional comparison.*

DISCUSSION AND CONCLUSION: *It was found that kinesiotaping for plantar fasciitis syndrome had a significant effect on pain, but this effect did not make a statistical difference compared to placebo.*

Keywords: *Plantar Fasciitis, Kinesiotaping, Balance, Fall Risk, Pain*

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Başvuru Tarihi: 15.11.2017
Kabul Tarihi: 28.03.2018

INTRODUCTION

Plantar fasciitis (PF) is the most common cause of plantar heel pain (1). It is also known as painful heel syndrome, heel spur syndrome, runner heel, subcalcaneal pain, calcaneodynia, plantar fasciosis, and calcaneal periostitis. The movements such as repetitive walking and running may cause micro-tears in the plantar fascia in the presence of triggering factors. Its etiology is unclear; however, factors such as decreased ankle dorsiflexion, increased body mass index (BMI), and prolonged standing time are thought to be associated with the PF risk (2).

Medical history and physical examination form the basis of the clinical diagnosis. Typical PF-associated pain is characterized by deep pain in the heel, which increases with activity after inactivity typically in the morning or after the first steps or after a long rest, alleviates during the activity, but which increases by the end of the day due to loading. Treatment is usually conservative. The complaints of 90-95% of the patients decrease within 12-18 months (1). Conservative treatments include activity modification, physical therapy agents, exercise, night splint, orthotics, non-steroid anti-inflammatory drugs (NSAIDs), steroid injection, platelet-rich plasma (PRP) injection, and extracorporeal shockwave therapy (ESWT) (1). Some studies reported that kinesio taping combined with conservative treatment also reduces pain (3).
Kinesio taping (KT) method was developed by Kenzo Kase in Japan and became popular also in other Asian countries followed by Europe and America (3). The tapes stretching only longitudinally for 55-60% of the rest length are applied to the skin at certain angles and positions (4). The PF is among the several pathologies of the musculoskeletal system where KT is used (5). Its mechanism of pain reduction is thought to be through the reduction of edema and inflammation, activation of the gate control mechanism and the descending inhibitory beams via sensory stimulation, and restoration of superficial and deep fascia function (6).

In this study, we aimed at investigating the effect of KT, which is increasingly used in the practice of physical medicine and rehabilitation, on balance, fall risk, and clinical parameters in patients with PF.

MATERIAL AND METHODS

A total of 41 patients who presented to our Physical Therapy and Rehabilitation Clinic between June and November 2016 with heel pain and were diagnosed with PF were included in this prospective, randomized, and controlled study. The patients were informed about the purpose, duration, method, possible side effects, and problems that could be encountered, and their consents were obtained. The Ethics Committee of İstanbul Medipol University School of Medicine has approved this study.

The patients older than 18 with heel pain localized in the plantar region for at least one month, who had aggravated pain while standing up in the morning or while walking after a long rest and whose pain had decreased with activity first but intensified as the activity continued, were included in the study and their informed consent forms were taken. Those who received corticosteroid injection within the last three months, had known allergies to kinesio tape, underwent surgery for PF, and had local infection, diabetic mellitus, peripheral neuropathy, systemic inflammatory diseases such as rheumatoid arthritis and ankylosing spondylitis, and sensory loss in foot and ankle were excluded from the study.

The patients with heel pain were diagnosed with PF on the basis of their medical history and physical examination. Direct radiography, magnetic resonance imaging (MRI), and blood tests were performed for the differential diagnosis when needed. Patients' complaints and socio-demographic data were collected. They were not allowed to use any analgesics during the treatment period.

Patients were evaluated before and one week after the treatment. Clinical evaluations were performed using the Visual Analog Scale (VAS), Nottingham Health Profile (NHP), and Foot Function Index (FFI); the Biodex Balance System (BBS) was used to assess balance and fall risk. Postural stability and fall risk were measured in dynamic conditions about anterior-posterior (AP) and medial-lateral (ML) planes (8°) with the BBS.

Treatment protocol

Patients were randomly assigned to treatment or control groups. The treatment group received KT application (actual taping - AT) twice a week in two sessions and was asked to apply cold packs twice a day (Figure 1. The control group received sham

taping (ST) and was similarly asked to apply cold packs twice a day. Both groups were given a home exercise program of plantar fascia stretching, strengthening of the ankle flexors, strengthening of the intrinsic muscles of the foot, and Achilles tendon stretching exercises along with descriptions. For the AT group, taping was on the basis of the plantar fasciitis taping described by Kenzo Kase (4). For the ST group, three pieces of approximately 5-cm-long tapes were used for sham taping (Figure 1-2).

Figure 1. *The actual taping*

Figure 2. The shame taping

Statistical Analysis

The data analysis was performed with SPSS 17.0 (SPSS Inc, Chicago, IL); the descriptive statistics were given as number, percentage, mean, standard deviation (SD), median, and quartiles. χ2-square test was used for the comparison of categorical variables; Wilcoxon test was used for the comparison of the pre- and post-intervention measurements within each group; and repeated measures analysis of variance (ANOVA) test was used to compare the efficacy of the interventions against each other. $p<0.05$ was considered statistically significant.

RESULTS

A total of 41 patients, 29 female and 12 male, with PF were initially included in the study. However, 8 female and 3 male patients who did not continue their follow-up controls were excluded, and the study was concluded with a total of 30 patients, 21 female and 9 male. The treatment (AT) and the control (ST) groups included 15 patients each. No statistically significant difference was found between the two groups in terms of gender, age, BMI, standing time, and duration of complaints **(Table 1).**

Table 1. Comparison of the groups in terms of some of the characteristics.

Characteristics	AT	ST	*p**
Age	47	43	0.755
Gender (Male/Female)	6/9	3/12	0.427
BMI (kg/m²)	29	32	0.219
Standing Time (hour)	4	4	0.310
Duration of Complaints (months)	10	6	0.585

AT: actual taping, **ST:** sham taping, **BMI:** body mass index

In the treatment group, there was a significant difference between the pre- and post-treatment scores in VAS, in the pain subdimension of NHP, and in all subdimensions of FFI except for the activity restriction subdimension **(Table 2).**

Table 2. Comparison of pre- and post-treatment scores of the treatment group in the VAS, NHP, FFI and their subdimensions.

	Pre-treatment Median (Quartiles)	Post-treatment Median (Quartiles)	*p**
VAS	7 (4-7)	3 (1-5)	**0.001**
NHP Pain	50 (37-62)	12 (0-50)	**0.002**
NHP Mobility	12 (0-25)	12 (0-12)	0.065
NHP Energy	0 (0-66)	0 (0-66)	0.916
NHP Sleep	20 (0-40)	20 (20-20)	1.000
NHP Social Isolation	0 (0-0)	0 (0-0)	0.157
NHP Emotional Reactions	0 (0-11)	0 (0-11)	0.705
FFI Total	32 (22-50)	22 (13-42)	**0.014**
FFI Pain	61 (35-70)	48 (30-61)	**0.004**
FFI Disability	26 (11-53)	16 (0-41)	**0.019**

VAS, visual analog scale; **NHP,** Nottingham health profile; **FFI,** foot function index

There was no significant difference between the pre- and post-treatment postural stability scores (PS API or MLI) obtained with BBS; however, significant difference was found between the pre- and post-treatment fall risk (FR) scores **(Table 3).**

Table 3. Comparison of pre- and post-treatment BBS scores of the treatment group.

	Pre-treatment Median (Quartiles)	Post-treatment Median (Quartiles)	*p**
PS 8 API	1 (0-1)	0 (0-1)	1.000
PS 8 MLI	0 (0-1)	0 (0-0)	0.257
FR 8	1 (1-1)	1 (0-1)	**0.020**

BBS, Biodex balance system; **PS,** postural stability; **FR,** fall risk; **API,** anterior-posterior index; **MLI,** medial-lateral index.

In the control group, there was a significant difference between the pre- and post-treatment scores in VAS, in the mobility and energy subdimensions of NHP, and in the activity restriction subdimension of FFI; there was no significant difference in other subdimensions **(Table 4 and Table 5).**

Table 4. Comparison of pre- and post-treatment scores of the control group in the VAS, NHP, FFI and their subdimensions.

	Pre-treatment Median (Quartiles)	Post-treatment Median (Quartiles)	*p**
VAS	7 (5-7)	4 (2-7)	0.007
NHP Pain	62 (25-100)	50 (25-62)	0.091
NHP Mobility	25 (12-50)	25 (0-25)	**0.007**
NHP Energy	66 (0-100)	0 (0-33)	**0.036**
NHP Sleep	20 (20-60)	20 (20-40)	0.068
NHP Social Isolation	0 (0-40)	0 (0-0)	0.071
NHP Emotional Reactions	22 (0-44)	11 (0-22)	0.107
FFI Total	45 (18-69)	52 (10-62)	0.125
FFI Pain	58 (50-80)	57 (27-80)	0.244
FFI Disability	45 (4-74)	54 (4-67)	0.801
FFI Activity Restriction	28 (0-40)	4 (0-26)	**0.016**

VAS, visual analog scale**; NHP,** Nottingham health profile**; FFI,** foot function index.

Table 5. Comparison of pre- and post-treatment BBS scores of the control group.

	Pre-treatment Median (Quartiles)	Post-treatment Median (Quartiles)	*p**
PS 8 API	1 (0-1)	1 (0-1)	0.272
PS 8 MLI	0 (0-1)	0 (0-1)	0.317
FR 8		1 (1-1) 1 (0-1)	1.000

BBS, Biodex balance system; **PS,** postural stability; **FR,** fall risk; **API,** anterior-posterior index; **MLI,** medial-lateral index.

When we compared the treatment and control groups in terms of pre/post-treatment change, no significant difference was found except for the disability subdimension of the FFI **(Table 6 and Table 7).**

Table 6. Inter-group comparisons of pre- and post-treatment scores in the VAS, NHP, FFI and their subdimensions

	Pre/Post Treatment	AT Median (Quartiles)	ST Median (Quartiles)	*p**
VAS	Pre-	7 (4-7)	7 (5-7)	0.079
	Post-	3 (1-5)	4 (2-7)	
NHP Pain	Pre-	50 (37-62)	62 (25-100)	0.059
	Post-	12 (0-50)	50 (25-62)	
NHP Mobility	Pre-	12 (0-25)	25 (12-50)	0.329
	Post-	12 (0-12)	25 (0-25)	
NHP Energy	Pre-	0 (0-66)	66 (0-100)	0.063
	Post-	0 (0-66)	0 (0-33)	
NHP Sleep	Pre-	20 (0-40)	20 (20-60)	0.139
	Post-	20 (20-20)	20 (20-40)	
NHP Social Isolation	Pre-	0 (0-0)	0 (0-40)	0.176
	Post-	0 (0-0)	0 (0-0)	
NHP Emotional Reactions	Pre-	0 (0-11)	22 (0-44)	0.102
	Post-	0 (0-11)	11 (0-22)	
FFI Total	Pre-	32 (22-50)	45 (18-69)	0.181
	Post-	22 (13-42)	52 (10-62)	
FFI Pain	Pre-	61 (35-70)	58 (50-80)	0.299
	Post-	48 (30-61)	57 (27-80)	
FFI Disability	Pre-	26 (11-53)	45 (4-74)	**0.018**
	Post-	16 (0-41)	54 (4-67)	
FFI Activity Restriction	Pre-	6 (0-20)	28 (0-40)	0.158
	Post-	4 (0-14)	4 (0-26)	

AT, actual tapin; **ST,** sham taping; **VAS,** visual analog scale; **NHP,** Nottingham health profile; **FFI,** foot function index

Table 7. **Inter-group comparisons of pre- and post-treatment BBS scores.**

	Pre/Post Treatment	AT Median (Quartiles)	ST Median (Quartiles)	*p**
PS 8 API	Pre-	1 (0-1)	1 (0-1)	0.380
	Post-	0 (0-1)	1 (0-1)	
PS 8 MLI	Pre-	0 (0-1)	0 (0-1)	0.165
	Post-	0 (0-0)	0 (0-1)	
FR 8	Pre-	1 (1-1)	1 (1-1)	0.091
	Post-	**1 (0-1)**	**1 (0-1)**	

AT, actual taping; **ST,** sham taping; **BBS,** Biodex balance system; **PS,** postural stability; **FR,** fall risk; **API,** anterior-posterior index; **MLI,** medial-lateral index

DISCUSSION

In our study, there was a significant decrease in VAS scores in both treatment (actual taping) and control (sham taping) groups but no significant difference was found between these groups. In the treatment group, a significant improvement was found in NHP pain, FFI total, pain, and, disability scores and BBS FR 8 scores after the treatment. In the control group, a significant improvement was found in NHP mobility and energy and FFI activity restriction scores after the treatment. When the scores of both groups were compared, a significant difference was found only in FFI disability score in favor of the treatment group.

Although there were several previous studies on kinesio taping (KT) in different soft tissue diseases (7,8,9,10), only one controlled study in patients with PF was found. In that study, Tsai et al. applied KT for PF in addition to the physical therapy protocol in the intervention group while using only the physical therapy protocol for the control group. They assessed the pain score and FFI and used ultrasound for the evaluation of plantar fascia before and after the therapy. A significant decrease was found in the pain scores of the intervention group compared to those of the controls, and a significant decrease was found in the thickness of the attachment point of plantar fascia (3). In contrast, we did not find a significant difference between the pain scores of the AT and ST groups in our study (p=0.079). The administration of exercise and cold packs to both groups might have contributed to the efficacy of the treatment, and the low number of patients might have contributed to these results. A significant improvement was found in the total FFI scores of the AT group after the treatment in comparison with the pre-treatment scores, but there was no significant difference in the scores of the control group. In addition, no significant difference was found between the AT and control groups. This was consistent with the results of Tsai et al..

Several previous studies have investigated the effect of KT on balance, but we have not found a study of such effects on balance in patients with the PF. These studies focused more on the patients with

chronic ankle instability, and conflicting results were found. In a study by Nakajima et al., 52 healthy volunteers were recruited and randomly divided into two groups; one receiving AT to the ankle and the other receiving ST. A significant change in the dynamic posture control was found in females but not in males (11).

In our study, a significant improvement was found in the FR 8 scores of the AT group after the treatment. There was no significant difference in the intra-group comparisons or in the comparisons of the two groups in terms of the other parameters.

Plantar fasciitis can be seen in all age groups and genders, but it is more common in females and has higher incidence between 30-70 years of age (12). In our study, 21 (70%) of the patients were female. The median age in the AT and ST groups were 47 and 43, respectively, which was comparable to previous studies.

Increased BMI is a risk factor. A previous study has found the odds ratio of patients with a BMI of ≥30 kg/m² compared to those with 25 kg/m² to be 5.6 (95% confidence interval 1.9-16.6, $p<0.01$) (12). In our study, the median BMIs in the AT and control groups were 29 kg/m² and 32 kg/m², respectively.

In our controlled study of the efficacy of KT, a significant difference was found in the VAS scores before and after the treatment in both groups ($p=0.079$). We think that these results might be due to small sample size and the effectiveness of the protocol recommendation of exercise and cold packs in both groups.

In conclusion, although we found that kinesio taping did not produce outcomes significantly different than placebo, except for the foot function index disability score, this treatment method should be considered among conservative treatments in patients with plantar fasciitis. We think that kinesio taping, which is less invasive, easier, and cheaper, should be considered among the treatment options and requires more studies involving more patients.

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