

Short-Term Efficacy of Kinesiotaping versus Extracorporeal Shockwave Therapy for Plantar Fasciitis: A Randomized Study

Nihal Tezel, Ebru Umay, Musa Bulut, Aytul Cakci

Physical Medicine and Rehabilitation Clinic, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey

Abstract

Background: Plantar fasciitis is a degenerative condition that is one of the most common causes of heel and foot pain. Among noninvasive management of plantar fasciitis, extracorporeal shockwave therapy (ESWT) has been extensively studied and found to be effective, but few studies have assessed the effectiveness of kinesiotaping (KT) method.

Objective: This study aimed to show the effectiveness of KT compared with ESWT in the management of plantar fasciitis.

Methods: A total of 84 patients with plantar fasciitis were enrolled from a single center and randomized into KT and ESWT treatment groups in a 1:1 ratio (i.e., 42 patients in each group); only one foot was considered for each patient. Both KT and ESWT were applied once a week for 6 weeks. Patients' pain, functional status and quality of life were evaluated with the visual analog scale (VAS), Foot Function Index (FFI) and the Short-Form-36 (SF-36) health survey, respectively. Patients' fat pat and plantar fascia thickness were measured using ultrasonography. All evaluations were performed before and immediately after the 6-week intervention.

Results: In the KT group, six patients were lost to follow-up; therefore, the final analysis only included 36 patients. After the intervention, there was a statistically significant improvement in the VAS and SF-36 scores of both groups ($P = 0.001$), but the FFI score improvement was statistically significant only in the KT group ($P = 0.001$). In both groups, the mean thickness of plantar fascia decreased after treatment and the mean thickness of the fat pat increased; however, the change was not statistically significant ($P = 0.935$ and $P = 0.832$, respectively).

Conclusion: Both KT and ESWT treatments improved pain levels and quality of life in patients with plantar fasciitis, but KT also improved functionality. Multicentered studies with larger sample size and longer follow-ups are required to further validate these findings.

Keywords: Extracorporeal shockwave therapy, heel pain, kinesio tape, pain, plantar fasciitis, quality of life

Address for correspondence: Dr. Nihal Tezel, Physical Medicine and Rehabilitation Clinic, Ministry of Health Ankara Diskapi Yildirim Beyazit Training and Research Hospital, Ankara, Turkey.

E-mail: nihaltezel@gmail.com

Submitted: 04-Jan-2020 **Revised:** 16-Apr-2020 **Accepted:** 02-Jun-2020 **Published:** 20-Aug-2020

Access this article online	
Quick Response Code:	Website: www.sjmms.net
	DOI: 10.4103/sjmms.sjmms_624_19

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Tezel N, Umay E, Bulut M, Cakci A. Short-term efficacy of kinesiotaping versus extracorporeal shockwave therapy for plantar fasciitis: A randomized study. Saudi J Med Med Sci 2020;8:181-7.

INTRODUCTION

Plantar fascia is a thick connective tissue that absorbs shock and provides support to the sole of the foot. Plantar fasciitis (PF) is a degenerative condition that is one of the main causes of heel and foot pain.^[1] The etiology of PF is multifactorial; obesity, pes planus, shortened Achilles tendon, prolonged weight bearing, inadequate stretching and biomechanical abnormalities can all cause PF.^[2] Extracorporeal shockwave therapy (ESWT), steroid injections, platelet-rich plasma, nonsteroidal anti-inflammatory drugs (NSAIDs), stretching and strengthening exercises, fabrication orthoses and taping are conservative treatment methods for PF.^[3] It has been estimated that about 90% of patients with PF get relief through conservative management alone.^[4] Although there are many treatment modalities, there is no consensus for a definitive nonsurgical method for symptom relief in individuals with PF.^[5]

Kinesiotaping (KT) is purported to facilitate and inhibit muscle activity. It corrects muscle function, causes lifting of the skin, provides space for lymphatic fluid movement and relieves abnormal muscle tension.^[6,7] In recent years, the use of KT has been increasing for many diseases, especially those of the musculoskeletal system. There are numerous studies showing the beneficial effect of KT in many diseases such as osteoarthritis, muscle strains and spine curvature disorders.^[8,9] For treating PF using conservative methods, ESWT has been shown to be effective in many studies.^[10,11] However, there are limited studies that have investigated the effectiveness of KT, which is a noninvasive, cost-effective and safe intervention, as part of PF treatment.^[12] The aim of the study was to determine the effectiveness of the application of KT as an integrative method in PF and to compare it with ESWT therapy.

METHODS

Study design

This was a single-center, observer-blinded, parallel-arm, randomized clinical study. The study was conducted on patients with a diagnosis of PF and who had been referred to the Physical Medicine and Rehabilitation Clinic of the University of Health Sciences, Ankara, Turkey, between November 2017 and September 2019. There were no changes in the method after the commencement of the study.

Participants

Inclusion criteria were as follows: (i) age ≥ 18 years; (ii) understanding the possible benefits and risks of the

research; (iii) pain on palpation of the medial tuberosity of the calcaneus and (iv) pain during the first steps that decreases after several steps but is exacerbated by increased activity.

Exclusion criteria were as follows: (i) previous foot surgery; (ii) a history of inflammatory rheumatic disease; (iii) a history of steroid injections and (iv) radiculopathy.

Diagnosis of PF was based on symptoms and physical examination and supported with ultrasonographic (USG) evaluation (only those with PF thickness of >4 mm were enrolled in this study).^[13] In patients with bilateral involvement, only the foot that was more affected, as reported by the patient, was selected; therefore, only one foot per patient was included in the study. The included foot of the patients was assessed before and after treatment for pain and functionality using evaluation scales.

Interventions and data collection

USG measurement was done before and after the treatment to compare the thickness of the fat pad and heel pad. Specialists with about 6 years of experience performed the USG evaluation and KT application (EU and NT, respectively); the assessor (EU) was blinded to the treatment groups.

Kinesiotaping method (Group 1)

Standard 2" (5 cm) Kinesio[®]-Tex tape (Kinesio Holding Corp., Albuquerque, NM, USA) was used. KT was applied to the plantar fascia and the application remained on the patient for 5 days. It was applied once a week, for 6 weeks. The taping was marked on the Achilles tendon. During the taping, the patient was in a prone position with the knee joints at 90° of flexion and the ankle joints at a neutral position. The tape was cut longitudinally into four slices of equal width. It was applied to the forefoot by stretching it by 25%. Finally, the KT space correction method was then applied [Figure 1].^[14]

All patients were informed about the possible adverse effects and instructed to report any such events to the researchers during the treatment. During the study period, paracetamol was allowed for pain for all patients, but NSAIDs were not allowed.

Extracorporeal shockwave therapy (Group 2)

The patients in the ESWT group were treated using the Swiss Dolorclast Master device (Electromedical Systems SA, Nyon, Switzerland) with 2000 shots at a frequency of six times per second, and an energy intensity level of 0.2 mJ/mm² focused shockwaves was applied once a week for 6 weeks by a physiotherapist (MB).



Figure 1: Kinesiotape application

All groups received education on activity modification and a home exercise program that included stretching of the hamstrings and ankle plantar flexors and strengthening exercises for the intrinsic and extrinsic muscles of the foot, as described previously.^[15] The exercises were shown to both groups at the beginning of the treatment by the physiotherapist (MB).

Primary outcomes

The primary outcome measures included pain, which was measured using a visual analog scale (VAS); health survey measurements, which were made using the Short Form-36 (SF-36); and functionality, which was demonstrated using the Foot Function Index (FFI). All measures were assessed at baseline and after completion of the 6-week therapy.

Secondary outcomes

The secondary outcome measures included adverse events such as discomfort, difficulty, inconvenience and wound development.

Demographic features

Patients' demographic characteristics including age, gender, educational status, body mass index (BMI) and symptom duration were documented.

Clinical, functional and quality-of-life evaluation

At the end of the intervention period, patients' pain level were measured using a 0- to 100-mm VAS (0 = no pain, 100 = the worst pain). The functional outcome was measured using the FFI, which consists of 23 items used to measure the impact of foot problems over the past week. The index has three subscales, namely, pain (9 questions), disability (9 questions) and activity limitation (5 questions).

Quality of life (QoL) was measured by the SF-36 score, which is a general health status survey consisting of 36 questions that assess eight domains of health-related QoL.

Radiological evaluation

Conventional radiography (X-ray) lateral view of the foot with weight bearing was used for evaluating the presence of the calcaneal spur and measurement of calcaneus inclination angle as well as to exclude any bony deformities or local infection.

Ultrasonographic evaluation

The USG evaluation was conducted with GE Logiq P5 (General Electric, Seoul, Korea) and a linear transducer (7–12 MHz). The heel of the patients was scanned in two-dimensional real-time B mode. Patients were examined in a prone position with an ankle joint neutral position. The thickness of the plantar fascia (medial calcaneal tubercle) and the plantar heel pad was measured.^[16]

Sample size

We applied a pilot study on eight patients to calculate the sample size. According to this pilot study data (mean FFI pain score 59 for KT and 51.5 for ESWT), to detect an effect size of 60% between the groups, the minimum patient number was estimated as 16 for each group with the Type I error of $\alpha = 0.05$, Type II error of $\beta = 0.2$ and with a 95% confidence interval using the G Power 3.1.8 analysis program (<http://www.psych.uni-duesseldorf.de/abteilungen/aap/gpower3>).

Randomization

All eligible patients who provided consent for participation were randomly assigned to either group using computer-generated numbers (simple randomization) in a 1:1 ratio.

Statistical analysis

Data analysis was conducted using SPSS version 22 for Windows (IBM Corp, Armonk, NY, USA). Normality was evaluated with the Kolmogorov–Smirnov test [Table 1]. The descriptive data were expressed as mean, standard deviation and percentages for nominal variables using the chi-square test. Statistically significant differences in repeated measurements within the groups were evaluated with the Wilcoxon signed rank test. The Bonferroni correction was used to avoid Type I errors in intragroup comparisons ($P < 0.025$). Statistically significant differences between the groups were analyzed with the Mann–Whitney *U*-test or the Fisher's exact test using a statistically significance level of $P < 0.05$.

RESULTS

During the study period, 90 patients with PF were eligible for the treatment. Of these, 6 patients refused to participate in the study; therefore, 84 patients with chronic PF were enrolled and randomly assigned to either the KT group or the ESWT group (42 patients [42 feet] in each group). In the KT group, six patients were lost to follow-up, and thus the final analysis for this group included 36 patients; there were no dropouts in the ESWT group [Figure 2].

There were no statistically significant differences in age, gender, BMI, symptom duration and baseline clinical measurements between the groups ($P < 0.05$). The demographic and baseline clinical characteristics of the groups are shown in Table 2.

After the treatment, there was a statistically significant improvement in the VAS-pain and SF-36 scores of both

groups ($P = 0.001$). There was a statistically significant improvement in FFI scores ($P = 0.001$) following the intervention only in the KT group. In both groups, the mean thickness of plantar fascia decreased after treatment and the mean thickness of the fat pat increased; however, the change was not statistically significant in either group ($P > 0.05$).

Table 3 shows the results obtained before and after the intervention for all the evaluation instruments. There was no statistically significant improvement in VAS-pain and SF-36 scores between the groups [Table 4].

Harms

No serious side effects were reported from the patients. In terms of minor side effects, three patients in the KT group reported itching.

DISCUSSION

The use of ESWT as a treatment modality of PF has been shown to be efficient in many studies; however, few studies have investigated the effectiveness of KT in treating PF, despite it being a cost-effective and generally safe intervention.^[17-19] Further, to the best of the author's knowledge, no study had previously compared the effectiveness of ESWT and KT methods in treating PF. Accordingly, the current study found that both ESWT and KT significantly reduce pain levels and increase QoL of patients with PF from baseline, with no significant difference between the groups; however, KT also improves functionality, as measured using FFI scores, which is not the case with ESWT.

Previously, application of KT has shown to reduce the pressure and stress on the plantar fascia.^[14] Taping therapy can be divided into the following two types: elastic and nonelastic. In most studies, the nonelastic, classical taping has been used in the treatment of PF;^[20] nonelastic taping is used for dynamic stability by providing support and protection. In the present study, the elastic KT method was used because it provides mechanical support that allows for a full range of motion and can facilitate the lymphatic system. Further, it provides kinesthetic awareness and can be used in all phases of injury, in contrast with the standard rigid taping techniques.^[6,14,21] The other treatment method, ESWT, which has been shown to be effective in chronic PF, uses acoustic waves that elicit an inflammatory response, stimulate the neovascularization at tendon–bone junction and promote inflammation.^[22]

In a study by Ordahan *et al.*,^[19] both ESWT and KT were found to be effective methods in treating PF,

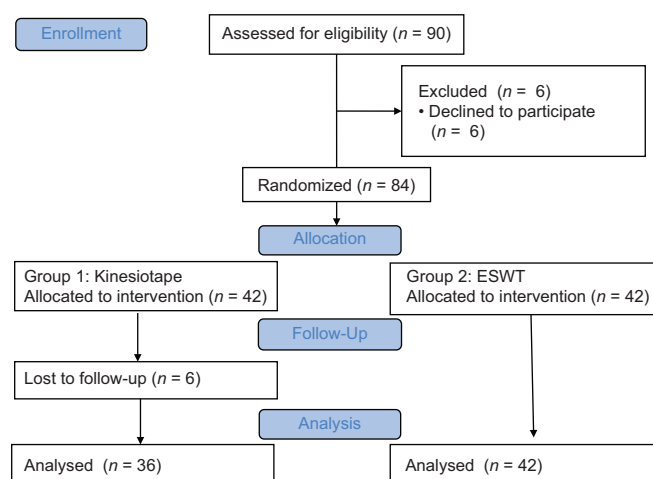


Figure 2: The flowchart of the study design

Table 1: Normalization results of the evaluation parameters by Kolmogorov-Smirnov test

Parameters	Kolmogorov-Smirnov	P
VAS	0.124	0.927
FFI		
Pain	0.832	0.087
Disability	0.122	0.155
Activity restriction	0.136	0.138
SF-36		
Physical functioning	0.121	0.185
Social functioning	0.509	0.673
Physical role limitations	0.181	0.099
Emotional role limitations	0.535	0.117
Mental health	0.309	0.322
Energy	0.268	0.186
Pain	0.174	0.497
Emotional well-being	0.329	0.163
Plantar fascia thickness (mm)	0.151	0.421
Fat pat thickness (mm)	0.292	0.148

VAS – Visual analog scale; FFI – Foot Functional Index; SF-36 – Short Form-36

Table 2: The baseline demographic and clinical characteristics of the groups

Demographic variables	Mean±SD		P
	Group 1 (n=36), n (%)	Group 2 (n=42), n (%)	
Age (years)	46.78±9.17	46.20±12.12	0.859
Gender			
Female	29 (80.6)	35 (83.3)	0.387
Male	7 (19.4)	7 (16.7)	
Educational status			
Literate	0	2 (4.8)	0.211
5 years	3 (8.3)	2 (4.8)	
8 years	29 (80.6)	32 (76.2)	
11 years	4 (11.1)	5 (1.9)	
More than 11 years	0	1 (2.3)	
BMI (kg/m ²)	32.2±4.9	31.9±7.2	0.343
Symptom duration (month)	81.26±12.90	88.50±16.21	0.620
VAS	7.52±2.17	7.32±2.40	0.670
FFI			
Pain	59.34±18.16	62.55±21.04	0.108
Disability	62.55±20.60	58.60±25.56	0.149
Activity restriction	56.43±26.90	52.71±25.13	0.530
SF-36			
Physical functioning	34.92±20.36	39.52±19.86	0.122
Social functioning	41.73±26.47	40.59±14.84	0.981
Physical role limitations	18.05±20.36	17.15±12.40	0.846
Emotional role limitations	22.66±20.37	23.46±17.55	0.715
Mental health	36.91±19.13	37.11±7.61	0.914
Energy	36.93±16.36	31.19±12.58	0.097
Pain	25.20±21.42	26.36±19.46	0.619
Emotional well-being	41.94±12.88	44.30±17.73	0.182
Plantar fascia thickness (mm)	4.49±2.78	4.53±2.51	0.741
Fat pat thickness (mm)	12.62±3.60	12.20±0.03	0.958

SD – Standard deviation; BMI – Body mass index; VAS – Visual analog scale; FFI – Foot Functional Index; SF-36 – Short Form-36

Table 3: Comparative results of the evaluation parameters before and after treatment of groups

Parameters	Mean±SD					
	Group 1 (n=36)			Group 2 (n=42)		
	Before	After	P	Before	After	P
VAS	7.58±1.18	4.86±1.55	0.001	7.82±1.20	5.40±1.80	0.001
FFI						
Pain	59.34±18.16	39.17±17.80	0.001	62.55±21.04	57.90±21.42	0.075
Disability	62.55±20.60	42.28±20.64	0.007	58.60±25.56	51.81±21.18	0.377
Activity restriction	56.43±26.90	27.86±18.95	0.001	52.71±25.13	44.67±26.46	0.162
SF-36						
Physical functioning	34.92±20.36	48.88±18.44	0.004	39.52±19.86	45.23±16.67	0.043
Social functioning	41.73±26.47	51.04±22.78	0.002	40.59±14.84	49.25±17.80	0.002
Physical role limitations	18.05±20.36	34.92±20.96	0.001	17.15±12.40	34.10±20.73	0.001
Emotional role limitations	22.66±20.37	29.10±19.42	0.041	23.46±17.55	27.60±21.40	0.049
Mental health	36.91±19.13	41.47±14.85	0.284	37.11±7.61	41.13±10.21	0.073
Energy	36.93±16.36	43.18±14.46	0.005	31.19±12.58	41.57±13.10	0.001
Pain	25.20±21.42	42.01±26.71	0.001	26.36±19.46	41.28±17.61	0.001
Emotional well-being	41.94±12.88	50.58±14.34	0.002	44.30±17.73	50.71±11.23	0.008
Plantar fascia thickness (mm)	4.49±2.78	3.61±1.64	0.105	4.53±2.51	3.70±1.71	0.103
Fat pat thickness (mm)	12.62±3.60	13.94±7.98	0.213	12.20±0.03	13.44±2.42	0.127

SD – Standard deviation; VAS – Visual analog scale, FFI – Foot Functional Index; SF-36 – Short Form-36

with no difference between the treatments. In contrast, the current study found that although the pain and QoL improvements were similar between the groups, functionality increased only in the KT group. Although the same tape was used in both studies, the taping techniques were different; Ordahan *et al.*^[19] used horizontal tapes and not palm tape application. The palm-shaped technique assists in the reduction of inflammation and edema.^[23]

In addition, different scales were used to evaluate the health status and functionality in both studies, which may have also contributed to the difference in findings. The validity and reliability of the FFI scale used in the current study have been demonstrated in PF patients;^[24] Ordahan *et al.*^[19] used the Foot and Ankle scores, which are mainly used to evaluate functionality pertaining to ankle instability.^[25]

Table 4: The evaluation parameters between the groups after treatment

Parameters	Mean±SD		P
	Group 1 (n=36)	Group 2 (n=42)	
VAS	-2.72±1.00	-2.39±1.68	0.306
FFI			
Pain	-20.17±16.51	-14.65±22.07	0.016
Disability	-20.26±12.04	-9.65±10.17	0.001
Activity restriction	-28.56±10.64	-8.04±26.36	0.001
SF-36			
Physical functioning	-6.25±10.58	-5.71±20.13	0.907
Social functioning	-9.30±19.03	-9.13±27.33	0.773
Physical role limitations	-15.80±18.02	-15.95±16.30	0.851
Emotional role limitations	-2.55±14.09	-4.40±14.36	0.157
Mental health	-7.04±22.03	-8.16±9.55	0.384
Energy	-8.13±23.12	-9.65±13.29	0.403
Pain	-16.80±17.10	-12.55±20.33	0.074
Emotional well-being	-10.01±14.92	-7.01±10.34	0.101
Plantar fascia thickness (mm)	-0.88±3.18	-0.83±2.45	0.935
Fat pat thickness (mm)	0.08±2.49	0.066±1.82	0.812

SD – Standard deviation; VAS – Visual analog scale; FFI – Foot Functional Index; SF-36 – Short Form-36

In another study, Ayhan *et al.*^[26] investigated the effectiveness of KT in improving pain, balance and functional status and reducing the risk of falls in patients with PF and found that KT had a significant effect on pain, but there was no difference with the control group. This may be explained by the sham application providing mechanical stimulation of skin mechanoreceptors and proprioception. As a result, pain may decrease by applying such a sham technique. In addition, evaluations had been made after a very short period of time (1 week), which may have been insufficient to highlight differences between the applications. In another study, Kim *et al.*^[27] have shown that a physical therapy agent with KT application for 6 weeks may alter the foot biomechanics as well as reduce pain. There is no study in the literature that included a single application method carried out over a 6-week duration, as the present study did. In the current study, a significant improvement was observed in both pain and functionality with a 6-week application. When taken together, the results of the current study as well as those of the above-discussed studies^[19,26,27] suggest that KT can provide a significant improvement in pain, functionality and QoL without the need for an additional physical therapy agent, probably by supporting the foot biomechanics in long-term applications.

USG was used as an imaging method in this study owing to its effectiveness in clinical practice as a simple, cost-effective, well-tolerated and noninvasive technique.^[28] In the present study, additive effect of neither ESWT therapy nor KT was found in the USG evaluation of plantar fascia and fat pat thickness.

The side effects measured included discomfort, difficulty, inconvenience and wound development. No serious side

effects were reported by the patients, with only three patients who in the KT group reporting itching.

A limitation of the study was that there was no third group that included exercise therapy only. In addition, the results may be limited because the trial was performed at a single center and the biomechanics of the foot, such as foot plantar pressure analysis, was not evaluated. However, the study used both clinical assessment and USG measures based on valid and standard measures.

CONCLUSION

This study found that KT is a safe and effective method for the treatment of PF. Both KT and ESWT treatments provide pain relief and improved QoL in patients with PF, but KT has a better effect on functionality as compared with ESWT. Multicentered studies with larger sample size and long-term follow-ups and inclusion of methods that detect biomechanical changes will further strengthen the findings of this study.

Ethical statement

The study protocol was approved by the Ethics Committee of University of Health Sciences, Ankara, Turkey, on November 6, 2017 (approval number: 42/08). A written informed consent was obtained from each patient. The study was conducted in accordance with the principles of the Declaration of Helsinki, 2013.

Peer review

This article was peer-reviewed by three independent and anonymous reviewers.

Acknowledgment

The authors are grateful to the patients for their cooperation and contribution to this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

- Schwartz EN, Su J. Plantar fasciitis: A concise review. *Perm J* 2014;18:e105-7.
- Tahririan MA, Motiffard M, Tahmasebi MN, Siavashi B. Plantar fasciitis. *J Res Med Sci* 2012;17:799-804.
- Mischke JJ, Jayaseelan DJ, Sault JD, Emerson Kavchak AJ. The symptomatic and functional effects of manual physical therapy on plantar heel pain: A systematic review. *J Man Manip Ther* 2017;25:3-10.
- Assad S, Ahmad A, Kiani I, Ghani U, Wadhera V, Tom TN. Novel and conservative approaches towards effective management of plantar fasciitis. *Cureus* 2016;8:e913.

5. Akinoglu B, Köse N. A comparison of the acute effects of radial extracorporeal shockwave therapy, ultrasound therapy, and exercise therapy in plantar fasciitis. *J Exerc Rehabil* 2018;14:306-12.
6. Morris D, Jones D, Ryan H, Ryan CG. The clinical effects of Kinesio® Tex taping: A systematic review. *Physiother Theory Pract* 2013;29:259-70.
7. Halseth T, McChesney JW, Debeliso M, Vaughn R, Lien J. The effects of kinesio™ taping on proprioception at the ankle. *J Sports Sci Med* 2004;3:1-7.
8. Borzi F, Szychlinska M, Di Rosa M, Musumeci G. A short overview of the effects of Kinesio taping for postural spine curvature disorders. *J Funct Morphol Kinesiol* 2018;3:59.
9. Castrogiovanni P, Di Giunta A, Guglielmino C, Roggio F, Romeo D, Fidone F, *et al.* The effects of exercise and kinesio tape on physical limitations in patients with knee osteoarthritis. *J Funct Morphol Kinesiol* 2016;1:355-68.
10. Bicer M, Hocaoglu E, Aksoy S, İnci E, Aktaş İ. Assessment of the efficacy of extracorporeal shockwave therapy for plantar fasciitis with magnetic resonance imaging findings. *J Am Podiatr Med Assoc* 2018;108:100-5.
11. Eslamian F, Shakouri SK, Jahanjoo F, Hajjaliloo M, Notghi F. Extracorporeal shock wave therapy versus local corticosteroid injection in the treatment of chronic plantar fasciitis, a single blinded randomized clinical trial. *Pain Med* 2016;17:1722-31.
12. Gonnade N, Bajpayee A, Elhence A, Lokhande V, Mehta N, Mishra M, *et al.* Regenerative efficacy of therapeutic quality platelet-rich plasma injections versus phonophoresis with kinesiotope for the treatment of chronic plantar fasciitis: A prospective randomized pilot study. *Asian J Transfus Sci* 2018;12:105-11.
13. Abul K, Ozer D, Sakizlioglu SS, Buyuk AF, Kaygusuz MA. Detection of normal plantar fascia thickness in adults via the ultrasonographic method. *J Am Podiatr Med Assoc* 2015;105:8-13.
14. Tsai CT, Chang WD, Lee JP. Effects of short term treatment with kinesiotope for plantar fasciitis. *J Musculoskelet Pain* 2010;18:71-80.
15. Kamonseki DH, Konçalves GA, Yi LC, Júnior IL. Effect of stretching with and without muscle strengthening exercises for the foot and hip in patients with plantar fasciitis: A randomized controlled single-blind clinical trial. *Man Ther* 2016;23:76-82.
16. Argerakis NG, Positano RG, Positano RC, Boccio AK, Adler RS, Saboeiro GR, *et al.* Ultrasound diagnosis and evaluation of plantar heel pain. *J Am Podiatr Med Assoc* 2015;105:135-40.
17. Roerdink RL, Dietvorst M, van der Zwaard B, van der Worp H, Zwerver J. Complications of extracorporeal shockwave therapy in plantar fasciitis: Systematic review. *Int J Surg* 2017;46:133-45.
18. Podolsky R, Kalichman L. Taping for plantar fasciitis. *J Back Musculoskelet Rehabil* 2015;28:1-6.
19. Ordahan B, Türkoğlu G, Karahan AY, Akkurt HE. Extracorporeal shockwave therapy versus kinesiology taping in the management of plantar fasciitis: A randomized clinical trial. *Arch Rheumatol* 2017;32:227-33.
20. Polakowski EG. Systematic Review of Musculoskeletal Taping Methods. Thesis. University of Pittsburgh; 2015.
21. Wu FL, Shih YF, Lee SH, Luo HJ, Wang WT. Development of a clinical prediction rule to identify patients with plantar heel pain likely to benefit from biomechanical anti-pronation taping: A prospective cohort study. *Phys Ther Sport* 2018;31:58-67.
22. Wang CJ. Extracorporeal shockwave therapy in musculoskeletal disorders. *J Orthop Surg Res* 2012;7:11.
23. Kase K, Wallis J, Kase T. Clinical Therapeutic Applications of the Kinesio Taping Method. 2nd ed. Tokyo: Ken Ikai Co Ltd; 2013.
24. Yalman A, Şen Eİ, Eskiuyurt N, Budiman-Mak E. Turkish Translation and Adaptation of Foot Function Index in Patients with Plantar Fasciitis. *Turk J Phys Med Rehab* 2014;60:212-22.
25. Roos EM, Brandsson S, Karlsson J. Validation of the foot and ankle outcome score for ankle ligament reconstruction. *Foot Ankle Int* 2001;22:788-94.
26. Ayhan M, Çakar E, Göktepe A, Ağırman M. The Effect of Kinesiotope on Pain, Balance and Falling Risks in Patients with Plantar Fasciitis. *Kocaeli Med J* 2018;7:92-9.
27. Kim TH, Koh EK, Jung DY. The effect of arch support taping on plantar pressure and navicular drop height in subjects with excessive pronated foot during 6 weeks. *J Korean Soc Phys Med* 2011;6:489-96.
28. Radwan A, Wyland M, Applequist L, Bolowsky E, Klingensmith H, Virag I. Ultrasonography an effective tool in diagnosis plantar fasciitis: A systematic review of diagnosis trials. *Int J Sports Phys Ther* 2016;11:663-71.