



Original Article

Comparison of Clinical Practices and Treatment Preferences by Physical Therapists for Patients of Plantar Fasciitis

Aqsa Faiz¹, Mubushara Afzal^{1*}, Malik Osama², Subita Kafeel³, Aisha Imran³, Bahadur Kanwer⁴

^{1*}South City Health Care Education Hub, Karachi, Pakistan. ²College of Physician and Surgeon, Islamabad, Pakistan. ³University of Karachi, Karachi, Pakistan. ⁴Aga Khan University Hospital, Karachi, Pakistan.

ABSTRACT

Background: Plantar fasciitis is a common and disabling condition. It is the most common cause of heel pain accounting for 11 to 15% of all foot symptoms and affects all age groups, genders, and ethnicities, with higher prevalence reported in females between 40 to 60 years. It is usually associated with pain at the calcaneum's anteromedial prominence and activity limitation. Various therapeutic approaches are used in the management of plantar fasciitis. **Objective:** The purpose of this study was to compare the clinical practice and treatment preferences in patients with plantar fasciitis within and after six weeks of the onset of plantar fasciitis using a self-designed questionnaire. **Methods:** This was a cross-sectional survey comprising 100 physical therapists working in different public and private selected clinical settings. Participants were selected through a simple random sampling technique. The study included all participants who were registered physiotherapists actively working in government/ private and welfare clinical settings whereas, those physiotherapists who are not working in clinical settings and have not treated plantar fasciitis patients were excluded from the study. After fulfilling the inclusion criteria, informed consent was obtained, and self-designed Performa was filled in. A self-designed questionnaire is used as a data collection tool. It comprised 12 closed-ended questions. Percentages were calculated for all quantitative variables. Descriptive statistics like mean and standard deviation were reported for quantitative variables. Spearman correlation coefficient was applied to assess the association between qualitative variables. **Results:** The results of this study suggested that the use of treatment modalities varied across physiotherapists. Within six weeks of onset, shoe alterations, strengthening exercises, steroid injection, acupuncture, and ultrasound showed significant results whereas, after six weeks of onset, wobble board, cryotherapy, steroid injections, and ultrasound showed significant results. **Conclusion:** The results of this study have highlighted the current level of evidence-based practice and diversity in the diagnosis, management, and treatment of plantar fasciitis used amongst physical therapists according to their clinical experience and availability of treatment modalities.

Access
the article
online



SCAN ME

***Correspondence:** Mubushara Afzal, South City Health Care Education Hub, Karachi, Pakistan
Email: mubusharaafzal@gmail.com
Keywords: clinical practices, physical therapy approaches; plantar fasciitis
DOI: 10.55735/hjprs.v4i1.203

Citations: Faiz A, Afzal M, Osama M, Kafeel S, Imran A, Kanwer B. Comparison of clinical practices and treatment preferences by physical therapists for patients of plantar fasciitis. The Healer Journal of Physiotherapy and Rehabilitation Sciences. 2024;4(1):917-926



Copyright©2024. The Healer Journal of Physiotherapy and Rehabilitation Sciences.

This work is licensed under [Creative Commons Attributions 4.0 International license](https://creativecommons.org/licenses/by/4.0/)

INTRODUCTION

Plantar Fasciitis, a pain in the heel is a common musculoskeletal problem likely to be affected among the middle-aged-adult population [1]. It is also commonly referred to as plantar heel pain, medial heel pain, plantar fasciitis, or jogger's heel [2,25]. It is one of the most prevailing self-limiting and delineating musculoskeletal foot conditions of today that is been widely diagnosed and treated by healthcare practitioners [3]. Plantar fasciitis has been estimated to affect more than 1 million people each year with a lifetime prevalence of more than 10% of the total population and is affecting the activities of daily living and quality of life in 1 out of 5 community members [4,5]. The exact prevalence and the prognosis are still not clear, though symptoms often resolve within due course of time. However, only 11-15% of cases require long-term medical care [4]. Plantar fascia: a deep fibrous membrane that fans on the sole originating from medial calcaneal tuberosity up to the metatarsal head contributing to forming the longitudinal arch of the foot [6,7,23]. It not only acts as a shock absorber of the body but also facilitates the intrinsic muscles for performing functional activities that facilitate static and dynamic movements during the gait cycle [7,8].

Plantar Fasciitis is a biomechanical, inflammatory, and overused soft tissue injury that causes inferior heel pain on the medial side that is progressive with marked thickening (Garrett et al., 2019). As the diagnosis is purely clinical, the foremost important sign is sharp stabbing or burning pain during the initial weight-bearing activities after getting off the bed that worsens through prolonged inactivity [10]. Along with pain, apparent tenderness on the medial calcaneal tubercle is palpable. Usually, passive stretching aggravates it and is reported as a positive passive stretching test confirming the physical examination [6]. Adequate

evidence proposes that this condition is not due to inflammation but primarily because of the degenerative changes in the biomechanics and architecture of the foot; in the absence of inflammatory markers and distinctive inflammatory signs, it is regarded as plantar fasciitis [10,12]. The individuals that are at high risk of plantar fasciitis include high-fat percentage in the body (BMI>25), increasing stress, limited ankle joint mobility, poor footwear, excessive pronation of foot, disproportionate running schemes, prolonged standing duration professions, sedentary lifestyle pattern, pinnacle foot arch, discrepancies in the length of the lower extremities and core foot muscles and tendon tightness [1,13]. Diverse treatment protocols are readily available worldwide for the management of plantar fasciitis dividing into surgical and non-surgical approaches. For non-surgical management use of anti-inflammatory non-steroidal drugs, conservative regimes, stretching, and trigger point management, cryotherapy in conjunction with orthotics, and use of electrotherapy modalities is widely used. For the invasive treatment ways, the use of steroidal and corticoid injections, surgical release of ligaments and platelet-rich therapies are practiced [14,11,5].

Plantar pain is the cardinal symptom of many foot and ankle conditions of a traumatic and non-traumatic nature. Upon diagnosis, the mechanism and presentation of signs and symptoms of the injury are also said to be communal in most cases [15,24]. In plantar fasciitis; at the calcaneal insertion more specifically at the medial region; inflammation may result in fasciitis that is responsible for the discomfort or the pain. It is more significant upon weight bearing after a prolonged duration of inactivity or after the first step in the morning [16]; a classic diagnostic characteristic of plantar fasciitis [17]. The pain is very sharp and burning in

nature originating from the medial calcaneal tuberosity and extending up to the lower leg affecting mobility, especially walking [18]. The weight-bearing areas of the foot such as the fore and rear foot are the two most prone areas to experience pain, discomfort, and soreness. These structures on the plantar surface of the foot are protected by a thick heel pad that aids in shock absorption [19]. Plantar fascia is said to be an integral element that is responsible for the proper functioning of the foot; dysfunction in it has a debilitating effect on the static and dynamic balance and core stability of the foot [20].

In the general population, foot problems have been said to affect 71-87% of the people who are responsible for foot deformities, postural alterations, loss of independence, and vulnerability ultimately reducing the quality of life and well-being. [21] With the advancing years, the revolutionary change in the pattern and availability of treatment protocols is the need of the hour. However, there is not much evidence that compares the statistical effectiveness and quantifies the role of treatment options within and after 6 weeks of the onset condition. The finding of this study could encourage the use of these treatment possibilities and their availability in rehabilitative settings through spontaneous outcomes that are both cost and time-effective.

METHODS

A cross-sectional survey was conducted among government, private, and welfare sectors. Questionnaires were filled in by 100 physical therapists working in tertiary care settings and private clinics. Participants were selected through a simple random sampling technique. After fulfilling the inclusion criteria, informed consent was obtained, and self-designed Performa was filled in. Working physiotherapists who are/have managed patients of plantar fasciitis in their clinical

settings. The study settings include Private organizations (Agha Khan Hospital, Liaquat National Hospital, Baqai University, Ziauddin University, Patel Hospital, National Medical Center, Darul Sehat Hospital), governmental sectors include (Dow University, Zainab Panjwani,) and welfare sectors (Al Mustafa Hospital, Memon Foundation, Al Umeed Rehabilitation Center). The study included all participants who were registered physiotherapists actively working in government/ private and welfare clinical settings whereas, those physiotherapists who are not working in clinical settings and have not treated plantar fasciitis patients were excluded from the study.

A self-designed questionnaire is used as a data collection tool. It comprised 12 closed-ended questions. The questionnaire is divided into two sections. The first section inquiries demographic information including gender, age, professional, and workplace details. The second section comprises subjective questions inquiring about the clinical work experience of physiotherapists, their working sector, the number of planter fasciitis patients treated in the last year, and clinical tests/tools used to diagnose the condition. It also investigates the average number of patients complaining about the plantar fasciitis condition in the clinical setting and how many sessions are offered to the patient to manage the pertaining issues. Furthermore, clinical chart-based questions relevant to the root cause of the condition were asked aiding in accurate identification and assisting in differential diagnosis amongst other musculoskeletal conditions that can lead to primary impairment. Another chart-based question related to treatment management modalities and techniques that were used and assisted in the management of the symptoms of plantar fasciitis within 6 weeks of onset and after six weeks. The data was analyzed using SPSS Data Entry Builder (version 21.0) and

percentages were taken for all quantitative variables. Descriptive statistics: mean and standard deviation were reported for quantitative variables. Spearman correlation coefficient was applied to assess the association between qualitative variables (P-value < 0.05 will be considered significant).

RESULTS

Amongst all participants, 20% of physiotherapists were reported to have been registered physiotherapists from < 1 year, 48% are from 1-4 years, 21% are from 5-8 years, 6% are from 9-12 years and only 5% are registered physiotherapists from > 13 years. 78% of physiotherapists were working in private hospitals, 11% were working in government hospitals, 5% were working in private clinics and 6% were reported doing private home base physiotherapy. Regarding diagnosis, it was reported that 75% of the included participants use the area of pain as a reference marker for making a diagnosis and 25% do not use it. 22% overlook the duration of pain and 78% do not give value to it. 55% of the therapists focus on patient-reported symptoms but 45% do not. Only 11% rule out differential diagnosis but 89% do not. 23% palpate in the area but 77% do not palpate. 33% perform windlass tests but 67% do not. In identifying practice regarding treatment techniques for plantar fasciitis within 6 weeks of onset. The study analyzed several treatment modalities used by physiotherapists and determined their statistical relevance. The therapists advised 79% of those who participated in shoe alterations/modifications, and this finding was statistically significant with a p-value of 0.028. Similarly, 69% of physiotherapists recommended calf stretching for patients with plantar fasciitis, but a p-value of 0.05 (0.356) revealed that calf stretching alone was insufficient for treatment. The strengthening recommendations for exercise among physiotherapists produced a statistically significant outcome (p-value

0.007). It was discovered that 38% of physiotherapists suggested exercise for strengthening to all patients, 45% to most patients, and 15% to some patients. Surprisingly, just 2% of physiotherapists said they never prescribed strength exercise. The research study did not produce a statistically significant outcome in terms of soft tissue mobilization (p-value of 0.05, 0.999). Approximately 50% of physical therapists utilized the soft tissue massage technique on all patients, 24% on most patients, and 20% on some patients. Only 6% of respondents said they have never used this approach in their clinical practice. The use of the wobble board approach produced no substantial statistical proof (p-value of 0.207). Only 3% of physiotherapists indicated that they utilized it for all patients, 14% for most patients, and 25% for some patients. Many physiotherapists

Table 1: Descriptive Variables

Variables	Categories	Percentage
Registered Physical Therapist	< 1 year	20%
	1-4 years	48%
	5-8 year	21%
	9-12 years	6%
	>13 years	5%
Working Sector	Government Hospitals	11%
	Private Hospitals	78%
	Private Clinics	5%
	Private Visits	6%
Diagnostic Marker	Area of pain	75%
	Duration of pain	22%
	Symptoms management	55%
	Differential diagnosis	11%
	Palpation	23%
	Windlass test	33%

(58%) said they never used a wobbleboard in their professional practice. Similarly, the use of cryotherapy and tapping/strapping did not produce statistically significant proof (p-values of 0.304 and 0.148, respectively). According to the findings, there is no considerable support for these practices among physiotherapists in their clinical practice. Finally, the study evaluated the various treatment options used by physical therapists, with footwear alterations/modifications and a regimen of strengthening exercises yielding statistically significant effects. Calf stretching alone, soft tissue mobilization, the wobble board approach, cryotherapy, and tapping/strapping, on the other hand, did not provide meaningful evidence in their application. These findings shed light on the therapeutic preferences and practices of the physiotherapists in the study group.

The study investigated physiotherapists' scientific practices and therapeutic preferences for individuals with plantar fasciitis. Most physical therapists recommended the usage of foot pads/insoles, with 62% suggesting them to all participants. However, a considerable proportion (10%) stated that they never used foot pads/insoles in their clinical practice. Similarly, physiotherapists differed in their recommendation of rest as part of the therapy method, with 14% recommending it in most patients and 15% recommending it in some patients. A small percentage (7%) said they never advised rest. The p-values for foot pads/insoles (0.546) and rest (0.687) were not statistically significant, indicating that there is not enough compelling proof to support the widespread acceptance or effectiveness of these therapies among the surveyed physiotherapists. Steroid injections were used by 6% of physiotherapists in all participants, whereas 31% advocated them in some patients. However, the vast majority (57%)

said they would never suggest steroid injections. The p-value of 0.046 demonstrated a high level of significance, indicating that the results concerning the usage of steroid injections are statistically significant. Acupuncture is used by just a few percent of physiotherapists, with only 2% utilizing it in all patients and 3% using it in most patients. Furthermore, 26% used acupuncture on some patients, showing its selective use. However, many physiotherapists (91%) said they never used acupuncture in their clinical practice. The obtained p-value of 0.084 indicated statistical significance for the acupuncture results.

In the management of electrotherapy modalities, Ultrasound, usage showed varied patterns among physiotherapists. Seventy-five percent of physiotherapists used Ultrasound on patients. Among them, 14% utilized it in most patients, 9% used it in some patients, and only 2% never employed it in their clinical practice. The statistical analysis yielded a p-value of 0.029 revealing that this treatment approach was statistically significant. Regarding the utilization of Pulsed Electromagnetic Energy, 3% of physiotherapists employed it in all patients. Among the practitioners, 8% used it in most patients, 21% utilized it in some patients, and a majority of 68% never incorporated it into their clinical practice. The corresponding P-value obtained was 0.558. The current was used by 2% of physiotherapists in all patients, with 8% using it in most patients, 21% applying it in some patients, and a majority of 69% never including it in their clinical practice. The obtained P-value for this technique was 0.187. In terms of Laser Therapy, 6% of physiotherapists employed this approach, primarily in most patients (10%), while the majority, 84%, never utilized it in their clinical practice. The associated P-value was 0.307. Lastly, Eutrophic Stimulation was employed by 3% of

Table 2: Electrotherapy Treatment Modalities Used Within Six Weeks of Onset

Ultrasound					
	All patients	Most patient	Some patients	Never	P-value
1-4 year	40	7	1	0	.029
5-8 year	16	1	4	0	
9-12 year	5	1	0	0	
>13 year	3	2	0	0	
Pulsed Electromagnetic Energy					
<1 year	0	2	4	14	.558
1-4 year	1	5	10	32	
5-8 year	1	0	5	15	
9-12 year	1	0	2	3	
>13 year	0	1	0	4	
Interferential					
<1 year	0	0	5	15	.187
1-4 year	1	5	8	34	
5-8 year	1	1	3	16	
9-12 year	0	1	2	3	
>13 year	0	1	3	1	
Laser Therapy					
<1 year		0	1	19	.307
1-4 year		3	4	41	
5-8 year		2	3	16	
9-12 year		0	2	4	
>13 year		1	0	4	
Eutrophic Stimulation					
<1 year		1	0	19	.290
1-4 year		1	3	44	
5-8 year		0	3	18	
9-12 year		0	0	6	
>13 year		1	0	4	

physiotherapists, with 6% using it in some patients, and a significant majority of 91% never incorporating it into their clinical practice. The obtained p-value for this technique was 0.290. In identifying practices regarding treatment techniques for plantar fasciitis after six weeks of onset. Among the

interventions discussed in this study, the use of wobble board exercises, ice application, ultrasound therapy and steroid injections demonstrated significant improvements ($p < 0.05$) in managing plantar fasciitis after six weeks of onset as shown in Table 3. These interventions showed statistically

Table 3: Electrotherapy Treatment Modalities Used After Six Weeks of Onset

Ultrasound					
	All patients	Most patient	Some patients	Never	P value
<1 year	1	4	8	7	.032
1-4 year	11	8	5	24	
5-8 year	9	2	6	4	
9-12 year	2	1	1	2	
>13 year	0	1	1	3	
Pulsed Electromagnetic Energy					
<1 year	0	1	1	18	.265
1-4 year	0	2	8	38	
5-8 year	1	0	4	16	
9-12 year	1	0	2	3	
>13 year	0	0	1	4	
Interferential					
<1 year	0	0	3	17	.325
1-4 year	1	1	8	38	
5-8 year	2	1	1	17	
9-12 year	0	0	3	3	
>13 year	0	0	1	4	
Laser Therapy					
<1 year	0	0	1	19	.200
1-4 year	0	4	4	40	
5-8 year	2	0	3	16	
9-12 year	0	0	2	4	
>13 year	0	0	1	4	
Eutrophic Stimulation					
<1 year	0	0	1	19	.853
1-4 year	1	1	4	42	
5-8 year	0	0	1	20	
9-12 year	0	0	1	5	
>13 year	0	0	1	4	

significant results in terms of reducing pain, and inflammation and promoting the healing of the plantar fascia. Conversely, interventions such as shoe advice, calf stretching, strengthening exercises, soft tissue massage, pulsed electromagnetic energy, interferential

therapy, laser therapy, eutrophic stimulation, acupuncture, strapping/taping, foot pad/insoles, and rest did not yield statistically significant results ($p>0.05$) after the six weeks' onset period.

DISCUSSION

The results of this study suggested that the use of treatment modalities varied across physiotherapists. Most respondents in this study did use the area of pain and symptoms reported by patients as a method of diagnosis while fewer respondents used the windlass test and duration of pain. Musculoskeletal physiotherapists are using authenticated judgment when selecting treatment protocols for plantar fasciitis as 90% of respondents indicated having guidelines in their department for treating this condition. Due to a lack of evidence for the most effective treatment modality for this condition, most physiotherapists will employ any technique for relieving pain, stretching tight muscles, and strengthening weak muscles. Sixteen different treatment methods used in the management of plantar fasciitis were identified by this survey. Shoe advice was identified as a popular treatment for plantar fasciitis within 6 weeks as well as after 6 weeks of onset. Calf stretches, cryotherapy, and ultrasound were used for all or most patients within 6 weeks of treatment while calf stretching, cryotherapy, and strengthening exercises were used for all or most patients after 6 weeks of treatment. The study found differences in clinical practices and treatment choices among physiotherapists treating individuals who have plantar fasciitis. Foot pads/insoles and rest were frequently recommended, although steroid injections and acupuncture were less routinely used. The statistical analysis revealed substantial results for the usage of steroid injections, indicating a topic of interest for future research. The lack of statistically significant differences for foot pads/insoles, rest, and acupuncture, on the other hand, highlights the need for more research to better understand the usefulness and uptake of these modalities in the treatment of plantar fasciitis.

In clinical practice, physiotherapists may

choose the electrotherapy agent with which they are most familiar and that is readily available. Because ultrasound is more commonly used than laser, it is more likely to be available for student physiotherapists once qualified and so present use is continued from one generation of physiotherapists to the next. Most of the respondents rely on the pain level to monitor the patient's progress. This could be because patients presenting with plantar fasciitis experience pain under the heel and have tenderness often extending along the entire inner portion of the plantar fascia. When a patient, therefore, reports a decrease in these symptoms, physiotherapists can use this as a subjective outcome.

CONCLUSION

This study has served to highlight the current level of evidence-based practice about plantar fasciitis by assessing the most observed technique for managing this condition in physiotherapists' everyday practice. This study has highlighted both agreement and diversity in musculoskeletal physiotherapists' approach to the diagnosis, management, and measurement of plantar fasciitis. It seems that certain clinical aspects of the literature have not been considered in some plantar fasciitis patient's treatment guidelines, which may have implications for clinical effectiveness and evidence-based practice.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.

Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.

Competing interests: None

Funding: No funding source is involved.

Authors' contributions: All authors read and approved the final manuscript.

REFERENCES

1. Juchli L. Effectiveness of massage including proximal trigger point release for plantar fasciitis: A case report. *Int J Ther Massage Bodywork*. 2021;14(2):22-29.
2. Kim J, Sung D, Lee J. Therapeutic effectiveness of instrument-assisted soft tissue mobilization for soft tissue injury: mechanisms and practical application. *J Exerc Rehabil*. 2017;13(1):12-22.
3. Ge W, Leson C, Vukovic C. Dry cupping for plantar fasciitis: a randomized controlled trial. *J Phys Ther Sci*. 2017;29(5):859-862.
4. Palomo López P, Becerro de Bengoa Vallejo R, Losa-Iglesias M, Rodríguez-Sanz D, Calvo C, López López D. Impact of plantar fasciitis on the quality of life of male and female patients according to the Foot Health Status Questionnaire. *J Pain Res*. 2018; 11:875-880.
5. Taş S. Effect of gender on mechanical properties of the plantar fascia and heel fat pad. *Foot Ankle Spec*. 2017;11(5):403-409.
6. Jones E, Finley M, Fruth S, McPoil T. Instrument-assisted soft-tissue mobilization for the management of chronic plantar heel pain: A pilot study. *J Am Podiatr Med Assoc*. 2019;109(3):193-200.
7. Sharma P. To compare the prevalence of plantar fasciitis among females wearing flat footwear and heels in young adults. *Indian J Physiother Occup Ther*. 2020;14(2).
8. Granado M, Lohman E, Daher N, Gordon K. Effect of gender, toe extension position, and plantar fasciitis on plantar fascia thickness. *Foot Ankle Int*. 2018;40(4):439-446.
9. Trojjan T, Tucker A. Plantar fasciitis. In: *StatPearls [Internet]*. Treasure Island (FL): StatPearls Publishing; 2020.
10. Ortega-Santiago R, Ríos-León M, Martín-Casas P, Fernández-de-las-Peñas C, Plaza-Manzano A. Active muscle trigger points are associated with pain and related disability in patients with plantar heel pain: A case-control study. *Pain Med*. 2019;21(5):1032-1038.
11. Ghotbi Joshvaghan H, Omidi-Kashani F. Plantar fasciitis risk factors in normal population. *Biosci Biotechnol Res Asia*. 2018;15(2):427-430.
12. Chawla J, Singh M, Ummat A, Goyal M, Kaur H, Verma V. Effectiveness of calf stretching exercises versus plantar fascia stretching exercises in plantar fasciitis: An experimental study. *Indian J Public Health Res Dev*. 2020;11(2):890.
13. Hasegawa M, Urits I, Orhurhu V, et al. Current concepts of minimally invasive treatment options for plantar fasciitis: A comprehensive review. *Curr Pain Headache Rep*. 2020;24(9):55. Khan, U., 2018. Functional Outcome of Plantar Fascia Specific Exercise Versus Corticosteroid Injection in Chronic Plantar Fasciitis. *Journal of Surgery Pakistan*, 23(1).
14. Funk C, Fraser J, Resch J. Sensorimotor deficits in distance runners with medial plantar pain.
15. Yelverton C, Rama S, Zipfel B. Manual therapy interventions in the treatment of plantar fasciitis: A comparison of three approaches. *Health SA Gesondheid*. 2019;24:e1257.
16. Engkananuwat P, Kanlayanaphotporn R, Purepong N. Effectiveness of the simultaneous stretching of the Achilles tendon and plantar fascia in individuals with plantar fasciitis. *Foot Ankle Int*. 2017;39(1):75-82.
17. Bagcier F, Yilmaz N. The impact of extracorporeal shock wave therapy and dry needling combination on pain and functionality in patients diagnosed with

- plantar fasciitis. *J Foot Ankle Surg.* 2020;59(4):689-693.
18. Mbue N, Wang W, Rosario M. Chronic foot pain and foot solutions in adults from different professions: the I-Corps-National Science Foundation Foot Health Survey.
 19. Howard Mettler J. Strain estimations of the plantar fascia and other ligaments of the foot: Implications for plantar.
 20. Rodríguez-Sanz D, Barbeito-Fernández D, Losa-Iglesias M, Saleta-Canosa J, López-López D, Tovaruela-Carrión N, Becerro-de-Bengoa-Vallejo R. Foot health and quality of life among university students: A cross-sectional study.
 21. Soundberg S, Johnson K. Painful conditions of the heel (1991). In: Jahss Med, editor. *Disorders of the foot and ankle: medical and surgical management*, vol. 2, Ch. 47. Philadelphia: W.B. Saunders; 1991. p. 1382-96.
 22. Hicks JH. The mechanics of the foot. II. The plantar aponeurosis and the arch. *J Anat.* 1954; 88:25–30.
 23. Thomas G, Martin RL, Cornwall MW, Wukich DK, Irrgang JJ, Godges JJ. Heel pain-plantar fasciitis: Clinical practice guidelines linked to the international classification of function, disability, and health from the orthopedics section of the American Physical Therapy Association. *J Orthop Sports Phys Ther.* 2008;38: A1–18.
 24. DeMaio M. Plantar fasciitis. *Orthopedics.* 1993;16(10):1153-1163.