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Common Clinical Treatment of Plantar Fasciitis: A Survey of Physical Therapists Practicing in the Northeast Region of the United States

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Abstract

Objective: The objective of this survey was to determine how physical therapists treat plantar fasciitis. The survey asked for information regarding years of experience, manual techniques, stretching activities and ultrasound application. The results of this survey were then compared to the suggestions found in the current literature.

Design: Physical therapists (N=136) responded to the twenty question survey posted on Survey Monkey. The responses were collected and compared to the published literature.

Results: The results from the survey indicate that physical therapists use a variety of interventions in the treatment of plantar fasciitis. Several of these treatment options may not be based on the current literature suggestions.

Conclusions: Physical therapists use a variety of interventions to treat plantar fasciitis. The conclusion of this study indicates the need for further research to support the numerous treatment options for plantar fasciitis.

Keywords: Plantar fasciitis; Ultrasound; Stretching; Survey

Background and Purpose

According to the literature, physical therapists treat plantar fasciitis using many different interventions. However, most treatment methods lack the evidence based support regarding their effectiveness. The goal of this study was to survey physical therapists in outpatient practice to determine the interventions they use to treat plantar fasciitis.

Subjects

A total of 136 licensed physical therapists in the northeast region of the United States responded to the survey. Those who responded are currently practicing in orthopedics, and indicated having treated plantar fasciitis during the last 12 months.

Methods

Physical therapists in the North-eastern United States were invited to visit Survey Monkey to complete a 20 question on-line survey of treatment methods used in their practice with patients diagnosed with plantar fasciitis.

Results

The majority of survey respondents had 10 or more years of clinical experience (62.5%); treat approximately 6 to 10 patients diagnosed with plantar fasciitis over a 12 month period (32.4%); use ultrasound in their treatments for plantar fasciitis (76.1%); perform a deep friction massage (92.5%); and add a wide range of stretching activities.

Introduction

Plantar fasciitis affects more than two million people per year and is one of the most common foot pathologies diagnosed in the United States [1-7]. Clinicians commonly apply local modalities, manual treatments and stretching techniques in spite of a general lack of clinical evidence to prove the effectiveness of some of these methods. Ranford et al. [6] refer to a systematic review citing, "26 conservative treatments that have been recommended for the treatment of plantar heel pain." Interventions included night splints, orthotic devices, shockwave therapy, stretching activities and other conservative modalities.

Use of a local modality to enhance treatment effectiveness is often considered when managing a patient with plantar fasciitis. Ultrasound is one of the more common clinical modalities used in physical therapy. Parameter selection for ultrasound application should be based on the type of pathology, location and tissue depth.

The purpose of this study was to learn which parameters physical therapists in orthopedic practice chose when applying ultrasound in the treatment of plantar fasciitis. The following research questions were addressed:

1. Do physical therapists apply ultrasound in their treatment of plantar fasciitis? If so, when in the treatment? Frequency? Duration? Duty Cycle?

2. Do physical therapist perform some type of transverse friction massage in their treatment of plantar fasciitis?

3. Do physical therapists perform stretching activities in their treatment of plantar fasciitis? If so, what is the length of the stretching activity? How many repetitions? What types of activities are performed?

Methods

A twenty question survey was developed and reviewed by a five member research group at the University of Hartford. The questions

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were developed based on the literature surrounding the application of ultrasound, the frequency and duration of stretching and common treatments associated with plantar fasciitis. Upon approval from the Human Subject Committee at the University of Hartford, the survey was placed on Survey Monkey.

The link to the survey was sent to regional managers of outpatient physical therapy practices throughout the northeast. They were asked to distribute the link to the physical therapists that they supervise. The regional managers who were still practicing were also asked to complete the survey. Several independent outpatient physical therapy practices were also contacted and asked if they would distribute the survey link to their practicing physical therapists, for completion. These independent sites were chosen if they had a website that contained a link to contact them via email.

Respondents

One hundred thirty-six licensed physical therapists responded to the survey. The only demographic information collected in this survey was the number of years of clinical experience held and approximate number of patients the physical therapist treated per 12 month period who were diagnosed with plantar fasciitis. Eighty-five (62.5%) of the 136 respondents indicated having 10 or more years of clinical experience. Forty four (32.4%) of the 136 respondents indicated that they have treated 6-10 patients with plantar fasciitis, over a 12 month period.

Results

Ultrasound application and the treatment of plantar fasciitis

In the first section of the survey, the questions asked the respondents if they applied ultrasound during the treatment of plantar fasciitis. One hundred two (76%) respondents indicated that they apply ultrasound during their treatment plan. Thirty-two (24%) physical therapists indicated that they do not use ultrasound in their treatment plan and were asked to skip the questions regarding ultrasound parameters.

Physical therapists were asked which parameters they preferred in their treatment. Sixty-seven (65%) of those who indicated they use ultrasound, chose a 1 MHz frequency ultrasound transducer, while 55 (54%) use a 3 MHz transducer. It should be noted that 49 (47%) of the respondents indicated that the ultrasound unit in their clinical setting limited their option of using a 1 or 3 MHz frequency.

Intensities chosen by the respondents ranged from 0-0.75 W/cm^2 to greater than 1.5 W/cm^2. The most common intensity (43%) was 1.1-1.2 W/cm^2, followed by 0.76-1.0W/cm^2 and 1.5 W/cm^2 or greater, both at 20%, respectively.

Duty cycles varied from 10% to 100%.Thirty-percent of those clinicians using ultrasound to treat plantar fasciitis reported setting the duty cycle at 10%, 20% or 50% duty cycle.

Combining the previous responses with the factor of time that the ultrasound was applied, 82 respondents (78%) indicated that they would apply the ultrasound for 6-8 minutes. The design of the survey did not link the time of application with any of the other parameters.

Manual therapy in the treatment of plantar fasciitis

The next group of questions in the survey asked physical therapists if they performed a form of deep friction massage or transverse friction massage along the fascia. One hundred twenty-three clinicians responded (92.5%) to indicate that they perform a transverse friction massage or deep friction massage. Thirty-percent indicated a total manual application time of 0-5 minutes, 35% indicated 5-8 minutes, 26% reported 9-10 minutes and 9% performed 11-15 minutes of friction massage.

Stretching activities in the treatment of plantar fasciitis

The final questions in the survey focused on stretching activities and the duration of the stretch as directed by the clinicians. Seventy-four percent of the respondents selected a standing gastroc and soleus stretch, 39% with a standing toe against the wall and 52% used the slant board for the gastroc and soleus stretching. 75% reported using a golf ball/tennis ball rolling during treatment. Respondents were also asked to indicate other stretching activities they preferred when treating plantar fasciitis. Table 1 lists some of those responses.

Frequency and duration questions indicated that 47% reported they choose 3 repetitions for 30 seconds per exercise activity.

Stretching Responses: "Other" Category
Seated Toe Extension Stretch
Over Stair
Seated Soleus with Toe Flexor Stretch
Standing Stretch on a Wedge
Ice Bottle Massage
Standing Ankle Circles/ Mobs
Acu-Life Foot Massager
Hallux Dorsiflexion to Stretch Plantar Fascia
Triplanar Stretching
Self Myofascial Massage with Foam Roller
Self-Passive Stretch with Metatarsals Passive Extension
Triplanar weight bearing using rear foot and fore foot wedges
Seated Great Toe Stretch
Sub-talar Joint Eversion self-mobs
Neural Mobilization (gliding)
Hamstring Stretch
Prostretch
Gastroc /Soleus Stretch with 1st MTP Extension
Arch Elevators
Manual Stretch of Tibialis Posterior

Table 1: Common stretching activities entered by clinicians into the "other" category.

Repetitions (if indicated)	Duration in Seconds (sec)
1	60
5	10
10	10 progress to 30
3	30
10-15	5-10
	120
	180
2	40
5	15
3	20
2	120
5	30
4	30
10	10*
5-10	5-10
10	2-3 increased to 5-8
12	10

*recommends 1-3 sets

Table 2: "Other" responses to frequency and duration of stretching activities.

Respondents were also allowed to report their preferred frequency and durations as indicated in table 2.

Discussion

Ultrasound

Plantar fasciitis affects more than two-million people per year and is the most common foot pathology diagnosed in the United States [1-7]. Characteristically, patients describe pain just distal to the medial tubercle of the calcaneus, increased pain while walking or first step pain, after a period of non-weight bearing.

Several authors have indicated the numerous treatment options for this condition including, shockwave therapy, shoe inserts, stretching, conservative modalities and night splints [2,3,5-8]. Ranford et al.[6] confirms that there is limited effectiveness of some of the common conservative treatments, but suggests that calf muscle stretching, while improving ankle range of motion, may reduce pain by reducing stress along the plantar fascia.

Drake et al.[3] suggests that initial treatment for plantar fasciitis begin with a temporary custom foot orthosis for a short period of time followed by stretching. "Overall, findings suggest that a TCFO for 2 weeks, followed by a stretching program, decreases overall pain and increases foot and ankle function in participants with PF". Other authors indicate that local modalities may offer a benefit in the treatment of plantar fasciitis. Ultrasound being one of the more common of these modalities, may offer benefits to patients with this painful pathology. The most popular ultrasound parameters selected during the survey were 1.0 MHz transducer, 1.1-1.2 W/cm^2 average intensity, 100% continuous duty cycle, applied for 6-8 minutes. The significance of these parameter settings are discussed below.

Tissue location and depth is one factor which determines the overall effectiveness of ultrasound as a viable modality. Hayes et al. suggests that a 1 MHz ultrasound transducer will have a therapeutic effect on tissue up to 5 cm in depth. A 3 MHz is then best suited for tissues up to 2.5 cm in depth [9-11]. The plantar fascia is a broad band of non-contractile tissue that remains relatively superficial. Plantar fascia is a palpable tissue that is within the depth range of the 3 MHz frequency and should be considered the optimal frequency during the treatment of this condition. The variance in ultrasound intensities could indicate that clinicians have a wide range of clinical goals in mind, or a misconception regarding the effect of the chosen ultrasound parameters on the tissue that is being treated.

The recent literature has indicated that the once thought etiology of plantar fasciitis was inflammation. Several authors currently indicate that there is evidence to suggest that plantar fasciitis is more of a degenerative condition, due to repetitive micro-trauma to the tissue [1,3,7]. Treatment goals for degenerative tissue would differ from treatment goals set for inflamed tissue.

Given the degenerative nature of this condition, the duty cycle and/or heating effect of ultrasound should be carefully considered. Plantar fascia is a non-contractile band of connective tissue that may require an increase in viscoelastic properties prior to stretching or manual manipulation for a more effective result. In most instances a continuous (100%) duty cycle, will allow for tissue heating, when applied for the proper duration. In order to increase the viscoelastic properties, the tissue will need an increase of 4°C above tissue baseline, commonly referred to as "vigorous heating"[12]. Draper has provided a means of calculating expected tissue temperature change. Using the information from Draper's work, a 3 MHz ultrasound set to 1.0 W/cm^2, continuous for 6.67 minutes will increase the tissue temperature 4°C above baseline. While the above parameters suggest a direct mode to increase tissue temperature to a vigorous heating level, there are several means by which the parameters can be manipulated to more gradually reach the 4°C above baseline temperature. For example, lowering the intensity to 0.5 W/cm^2, the ultrasound would have to be applied for greater than 10 minutes to reach the viscoelastic heating effect. This temperature increase may be warranted in sub-acute or chronic conditions.

Selecting a pulsed ultrasound is believed to offer therapeutic benefits without an increase in tissue temperature, and may be applied to acute injuries. Many clinicians chose a pulsed setting with the idea that it offers non-thermal tissue healing benefits, and no increase the tissue temperature. As stated by Gallo et al. [10] the association of a pulsed ultrasound as strictly a non-thermal modality is an "oversimplification", and "is likely to be problematic in establishing appropriate dosages of pulsed ultrasound in clinical practice."

Gallo et al. has shown that a pulsed ultrasound does not always result in a non-thermal effect. He and his colleagues have indicated that ultrasound parameters set to 3MHz with a 50% duty cycle and a 1.0 W/cm^2 intensity for a period of 10 minutes had an equal effect on heating the tissue as did a 3MHz frequency with a 100% duty cycle and 0.5 W/cm^2 intensity, applied for 10 minutes [10]. In this example, the tissue was heated to approximately 3°C above baseline with both the continuous duty cycle and at 50%. Simply by manipulating the parameters; increasing the treatment time or the intensity can increase the tissue temperature enough to reach the desired treatment effects, regardless of the duty cycle. Clinically, pulsed ultrasound is believed to offer tissue healing benefits without added heat. Given the chronic, degenerative nature of plantar fasciitis as a pathology, [2,5,6,8,13,14] without a tissue temperature increase of 3 to 4°C above baseline temperature, pulsed ultrasound used non-thermally may not supply enough energy to provide the needed benefits.

The duration of ultrasound application to increase the tissue temperature differs when using a 1 MHz frequency versus a 3 MHz frequency. Also, those using a pulsed setting for the non-thermal benefits should choose a slightly longer duration when working with 10% or 20% duty cycle. Johns reported that a pulsed ultrasound (20%) can be applied up to 10 minutes at an intensity of 0.5 W/cm^2, without an increase in tissue temperature. Using these parameters the clinician would rely on the therapeutic effects of a non-thermal application [15].

Transverse friction massage

Struijs et al. and Sevier et al. report transverse friction massage should be performed for treatment times between 5 and 10 minutes [16,17]. Both authors report on the treatment effectiveness of elbow lateral epicondylitis, and offer the given range when performing transverse friction massage. The survey indicated a variety of manual treatment times; the most common choice was 5-8 minutes which may be limited to clinician fatigue and/or patient tolerance.

Stretching

Another common treatment strategy for effectively managing plantar fasciitis is stretching. Several authors have suggested that effective durations of 30 seconds to 1 minute, at least three sets, up to three sessions per day show significant changes in range of motion [18-21]. Drake et.al, Cleland et al. and Di Giovanni et al. [3,1,8] have

shown favorable results in the treatment of plantar fasciitis with stretching exercises of the gastrocnemius, soleus, and plantar fascia. Drake et al. [3] recommends a plantar fascia stretch with soft tissue mobilization, along with gastroc and soleus standing stretching. Di Giovanni et al. works indicate similar stretching exercises leading to successful treatment outcomes in subjects with plantar fasciitis [2,8].

Several different exercises with varying repetitions and durations have been reported by the clinicians as their preferred choice for the treatment of plantar fasciitis. The responses ranged from 2 of 15 seconds, 10 of 10 seconds through 10-15 sets of 5-10 seconds. Drake et al. [3] had subjects perform 4 repetitions for duration of 30 seconds in his study for the treatment of plantar fasciitis, while Di Giovanni et al. [8] and recommend 10 repetitions for 10 second duration.

Several authors cited in this paper have indicated that a low load, long duration approach may be best suited for the treatment of plantar fasciitis, suggesting minimally 3 sets with duration of 30 seconds [1,3,8]. Tissue stretching held for a minimum of 30 seconds proved superior when compared to 10 and 15 second durations [18, 19,21].

Conclusion

An evidence based approach is a necessity to validate the effectiveness of treatment options available and to continue to promote physical therapy as an autonomous profession. As indicated by the survey results, physical therapists use a variety of methods and modalities to treat plantar fasciitis. While the common goal is to provide the best treatment approach for our patients diagnosed with plantar fasciitis, optimal treatment approaches need additional investigation (Appendix 1). Further research is needed to continue to endorse these treatment options and strengthen the foundation of the profession.

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Presentations

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References

1. Cleland JA, Abbott JH, Kidd MO, Stockwell S, Cheney S, et al. (2009) Manual physical therapy and exercise versus electrophysical agents and exercise in the management of plantar heel pain: a multicenter randomized clinical trial. J Orthop Sports Phys Ther 39: 573-585.
2. Digiovanni BF, Nawoczenski DA, Malay DP, Graci PA, Williams TT, et al. (2006) Plantar fascia-specific stretching exercise improves outcomes in patients with chronic plantar fasciitis. A prospective clinical trial with two-year follow-up. J Bone Joint Surg Am 88: 1775-1781.
3. Drake M, Bittenbender C, Boyles RE (2011) The short-term effects of treating plantar fasciitis with a temporary custom foot orthosis and stretching. J Orthop Sports Phys Ther 41: 221-231.
4. Flanigan RM, Nawoczenski DA, Chen L, Wu H, DiGiovanni BF (2007) The influence of foot position on stretching of the plantar fascia. Foot Ankle Int 28: 815-822.
5. League AC (2008) Current concepts review: plantar fasciitis. Foot Ankle Int 29: 358-366.
6. Radford JA, Landorf KB, Buchbinder R, Cook C (2007) Effectiveness of calf muscle stretching for the short-term treatment of plantar heel pain: a randomised trial. BMC Musculoskelet Disord 8: 36.
7. Renan-Ordine R, Alburquerque-Sendín F, de Souza DP, Cleland JA, Fernández-de-Las-Peñas C (2011) Effectiveness of myofascial trigger point manual therapy combined with a self-stretching protocol for the management of plantar heel pain: a randomized controlled trial. J Orthop Sports Phys Ther 41: 43-50.
8. DiGiovanni BF, Nawoczenski DA, Lintal ME, Moore EA, Murray JC, et al. (2003) Tissue-specific plantar fascia-stretching exercise enhances outcomes in patients with chronic heel pain. A prospective, randomized study. J Bone Joint Surg Am 85A: 1270-7.
9. Hayes BT, Merrick MA, Sandrey MA, Cordova ML (2004) Three-MHz Ultrasound Heats Deeper Into the Tissues Than Originally Theorized. J Athl Train 39: 230-234.
10. Gallo JA, Draper DO, Brody LT, Fellingham GW (2004) A comparison of human muscle temperature increases during 3-MHz continuous and pulsed ultrasound with equivalent temporal average intensities. J Orthop Sports Phys Ther 34: 395-401.
11. Rose S, Draper DO, Schulthies SS, Durrant E (1996) The Stretching Window Part Two: Rate of Thermal Decay in Deep Muscle Following 1-MHz Ultrasound. J Athl Train 31: 139-143.
12. Draper DO, Castel JC, Castel D (1995) Rate of temperature increase in human muscle during 1 MHz and 3 MHz continuous ultrasound. J Orthop Sports Phys Ther 22: 142-150.
13. Cole C, Seto C, Gazewood J (2005) Plantar fasciitis: evidence-based review of diagnosis and therapy. Am Fam Physician 72: 2237-2242.
14. McPoil T, Martin R, Cornwall M, Wukich K, James J et al. (2008) Heel Pain-Plantar Fasciitis: Clinical practice guidelines linked to the international classification of function, disability, and health from the orthopaedic section of the american physical therapy association. J Orthop Sports Phys Ther 38.
15. Johns LD (2002) Nonthermal Effects of Therapeutic Ultrasound: The Frequency Resonance Hypothesis. J Athl Train 37: 293-299.
16. Sevier TL, Wilson JK (1999) Treating lateral epicondylitis. Sports Med 28: 375-380.
17. Struijs PA, Damen PJ, Bakker EW, Blankevoort L, Assendelft WJ, et al. (2003) Manipulation of the wrist for management of lateral epicondylitis: a randomized pilot study. Phys Ther 83: 608-616.
18. Bandy WD, Irion JM (1994) The effect of time on static stretch on the flexibility of the hamstring muscles. Phys Ther 74: 845-852.
19. Decoster LC, Scanlon RL, Horn KD, Cleland J (2004) Standing and Supine Hamstring Stretching Are Equally Effective. J Athl Train 39: 330-334.
20. Laudner KG, Sipes RC, Wilson JT (2008) The Acute Effects of Sleeper Stretches on Shoulder Range of Motion. J Athl Train 43: 359-363.
21. O'Sullivan K, Murray E, Sainsbury D (2009) The effect of warm-up, static stretching and dynamic stretching on hamstring flexibility in previously injured subjects. BMC Musculoskelet Disord 10: 37.