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Title: Plantar Fasciitis Interventions					Searches: PubMed, Cochrane, CINAHL, Web of Science
Author/Year	Purpose/Design	Subjects/Inclusion Criteria	Intervention	Outcomes Measures	Conclusion/Limitations
Non-Steroidal Anti-Inflammatory					
Donley et al., 2007 ¹	<u>Purpose:</u> To determine the efficacy of using NSAIDs in the treatment of plantar fasciitis. <u>Design:</u> RCT	<u>Subjects:</u> 29 patients (21 females) Mean age 51.1 years <u>Inclusion Criteria:</u> Subjects diagnosed with plantar fasciitis that were being treated conservatively.	Treatment group (n=12) received a 200 mg Celecoxib once a day for 30 days. Control group (n=17) received a placebo pill once a day for 30 days.	Foot Function Index for pain and disability. Follow ups were performed at 1, 2, and 6 months.	<u>Results:</u> Both groups demonstrated significantly improved pain and disability. Treatment group had greater improvement but there was not a statistically significant difference between groups. <u>Limitations:</u> Subjects conservative treatment was not standardized, small sample size not enough to demonstrate statistical significance.
Stretching					

<p>DiGiovanni et al., 2003²</p>	<p><u>Purpose:</u> To determine if plantar fascia specific stretches provide better outcomes than Achilles tendon stretches.</p> <p><u>Design:</u> RCT</p>	<p><u>Subjects:</u> 101 patients (68 Females) Mean age 46 years</p> <p><u>Inclusion:</u> Patients had diagnosis of chronic plantar fasciitis with a symptom duration of at least 10 months.</p>	<p>All participants received prefabricated soft insoles, a three-week course of Celecoxib, and an education video in regards to plantar fasciitis. Subjects were also given a written protocol of the stretching activities and a daily log to document completion.</p> <p>Stretches were held for a count of 10 seconds and repeated 10 times, 3 times per day.</p> <p>Plantar fascia specific stretch group (n=46) hand was used to extend toes while foot was in dorsiflexed position. Toes were extended until stretch was felt in the arch of the foot.</p> <p>Achilles specific stretch group (n=36) stood and leaned into the wall with the knee extended until stretch was felt in Achilles</p>	<p>Foot Function Index for pain.</p> <p>Used another outcome survey that incorporated generic and condition specific outcome measures related to pain, function, and satisfaction.</p> <p>Follow up was performed at 8 weeks.</p>	<p><u>Results:</u> Plantar fascia specific stretches demonstrated greater improvements in pain, function, and satisfaction compared to Achilles stretches.</p> <p><u>Limitations:</u> Significant dropout rate (9% in PF specific group and 28% in Achilles specific group) that was not adjusted for via a sensitivity analysis. Long term results are not known due to the relatively short follow up (8 weeks).</p>
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Porter et al., 2002 ³	<p><u>Purpose:</u> To compare the effectiveness of sustained stretching versus intermittent stretching.</p> <p><u>Design:</u> RCT</p>	<p><u>Subjects:</u> 94 patients (56 Females) Mean age 45 years</p> <p><u>Inclusion:</u> Diagnosed with posterior heel syndrome.</p>	<p>Sustained group (n=54) performed stretching activity for 3 minutes at a time, 3 times a day.</p> <p>Intermittent group (n=40) performed stretching activity for five 20 second intervals, twice a day.</p> <p>Subjects keep an exercise log to document compliance.</p>	<p>American Academy of Orthopaedic Surgeon's (AAOS) Lower Limb Core Module and Foot and Ankle Module questionnaires.</p> <p>Ankle dorsiflexion measured with a goniometer.</p> <p>Follow ups were completed at 4, 8, 12, and 16 weeks.</p>	<p><u>Conclusions:</u> Both sustained and intermittent stretches improved flexibility, function, and pain. No significant difference between groups</p> <p><u>Limitations:</u> Authors did not address the effect that plantar fascia specific stretches has on heel pain.</p>
Lee et al., 2012 ⁴	<p><u>Purpose:</u> To determine the effectiveness of dorsiflexion night splints in combination with orthoses.</p> <p><u>Design:</u> Quasi-experimental</p>	<p><u>Subjects:</u> 28 patients (26 Females) Mean age 44 years</p> <p><u>Inclusion:</u> Individuals over 18 years old with diagnosis of plantar fasciitis.</p>	<p>Group A only received foot orthoses.</p> <p>Group B received foot orthoses with an adjustable night splint.</p> <p>Neither group received any other plantar fasciitis treatment.</p>	<p>Foot Function Index for pain, disability, and activity limitation.</p> <p>Follow ups were performed at 2 and 8 weeks.</p>	<p><u>Conclusions:</u> Night splints in combination with foot orthoses yielded greater improvement in self-reported function and pain versus orthoses alone.</p> <p><u>Limitations:</u> No randomization, relatively short follow up (8 weeks), and small sample size.</p>
Strengthening					
Rathleff et al., 2015 ⁵	<p><u>Purpose:</u> To determine if high load strength</p>	<p><u>Subjects:</u> 48 patients (32 females)</p>	<p>All subjects received shoe inserts and</p>	<p>Foot Function Index for pain, disability, and activity</p>	<p><u>Conclusions:</u> At 3 months, the high load strength training group had greater</p>

	<p>training was more effective than plantar fascia specific stretching at improving pain and function.</p> <p><u>Design</u>: RCT</p>	<p>Mean age 46 years</p> <p><u>Inclusion</u>: Diagnosis of plantar fasciitis, symptoms for at least 3 months, and had a plantar fascia thickness of 4.0 mm or greater.</p>	<p>educational material regarding plantar fasciitis</p> <p>PF specific stretch group (n=24) placed hand at base of toes and extended toes until stretch was felt at the arch of the foot. Stretch was performed 10 times for 10 seconds, 3 times a day.</p> <p>High load strength training group (n=24) performed unilateral heel raises with a towel underneath the toes to activate the windlass mechanism. Each heel raise consisted of a 3 second concentric phase and a 3 second eccentric phase. These were performed every other day. Began with 3 sets of 12 repetitions and gradually progressed activity.</p>	<p>limitation</p> <p>Ultrasonographic measurements for plantar fascia thickness.</p> <p>Follow ups were performed at 1, 3, 6, and 12 months (only FFI was assessed at the 12 month follow up).</p>	<p>improvements in function, a quicker reduction in pain, and greater patient satisfaction. At 12 months, there was no significant difference between the groups. Authors theorized that this might be due to subjects not performing exercises once they reached a satisfactory pain level.</p> <p><u>Limitations</u>: Subjects were not required to keep an activity log so it is unknown how adherent they were to the exercise protocols.</p>
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<p>Snyder et al., 2009⁶</p>	<p><u>Purpose:</u> To determine if hip strengthening influenced lower extremity mechanics during running.</p> <p><u>Design:</u> Quasi-experimental</p>	<p><u>Subjects:</u> 15 female participants Mean age 21 years</p> <p><u>Inclusion:</u> Individuals that performed 30 minutes of moderate intensity activity most days of the week and had a regular menstrual cycle.</p>	<p>Each participant attended 3 supervised training sessions per week for 6 weeks. These sessions consisted of closed chain hip abduction and rotation exercises.</p>	<p>Hand held dynamometer was used to measure hip abduction and external rotation strength.</p> <p>Kinematic data of lower extremity was measured with a force plate and a seven camera Motion Analysis Eagle System during running.</p> <p>Follow ups were performed at 3 and 6 weeks.</p>	<p><u>Conclusions:</u> Strengthening hip abductors and external rotators significantly decreased eversion ROM, hip internal ROM, rearfoot inversion moment, knee abduction moment, and increased hip adduction ROM. Ultimately, this led to improved lower extremity joint loading response, which decreases the risk of lower extremity injury.</p> <p><u>Limitations:</u> Small sample size and excluded patients with excessive pronation (>10 mm of navicular drop).</p>
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Orthoses

<p>Lee et al., 2009⁴</p>	<p><u>Purpose:</u> To analyze the short and long term effects of foot orthoses on self-reported pain and function in patients with plantar fasciitis.</p> <p><u>Design:</u> Systematic Review and Meta-Analysis</p>	<p><u>Subjects:</u> n=277, Six studies</p> <p><u>Inclusion:</u> RCT, quasi-randomized, or prospective cohort studies that examined the efficacy of orthoses for patients with plantar fasciitis in regards to pain and function.</p>	<p>Experimental groups- Received orthoses.</p> <p>Types of orthoses included non-magnetized cushioned insole, medial arch support with forefoot posting, customized orthoses, and prefabricated orthoses.</p> <p>Control groups- None of the included studies had a true control group that</p>	<p>Studies used varying outcome measures which included the Visual Analogue Pain Scale, Foot Function Index, Verbal Pain Scale, Foot and Ankle Outcome Score, and Foot Health Status Questionnaire Pain Score.</p> <p>Follow ups varied between 2 and 52 weeks.</p>	<p><u>Conclusion:</u> Orthoses significantly improves pain and function in both short and long term regardless of the type of orthosis used.</p> <p><u>Limitations:</u> The overall quality of the selected studies were not high (average 6.2/10 on PEDro Scale). Majority of the studies had a small sample size with low power. No true control groups.</p>
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			received no orthoses intervention.		
Hawke et al., 2008 ⁷	<p><u>Purpose:</u> To determine the effectiveness of custom foot orthoses for foot pain.</p> <p><u>Design:</u> Systematic Review</p>	<p><u>Subjects:</u> n=1332 participants, 11 trials (72.5% female)</p> <p><u>Inclusion:</u> Randomized or controlled trials that evaluated custom foot orthoses.</p>	<p>Experimental group- Custom fabricated orthoses.</p> <p>Control group- sham orthoses, standardized intervention, or prefabricated orthoses.</p>	<p>Studies used varying outcome measures that included the Foot Function Index, Visual Analog Scale, Foot Health Status Questionnaire, Foot and Ankle Outcome Score Pain, numeric pain rating scale, and the walking component of the Toronto Activities of Daily Living Measure.</p> <p>Follow ups varied between 2 months to 3 years.</p>	<p><u>Conclusions:</u> Custom foot orthoses were not more effective than prefabricated orthoses for reducing pain, but they did have a significant improvement in regards to function over the control groups. This became non-significant after 8 weeks.</p> <p><u>Limitations:</u> Studies had a moderate-high risk of bias due to lack of blinding, which would be difficult to accomplish.</p>
Fong et al., 2012 ⁸	<p><u>Purpose:</u> To determine the effectiveness of combining orthoses with rocker bottom shoes for individuals with plantar fasciitis.</p> <p><u>Design:</u> Cross-over study</p>	<p><u>Subjects:</u> 15 patients (12 females) Mean age 50.6 years</p> <p><u>Inclusion:</u> Aged between 40 and 65 years old, confirmed diagnosis of plantar fasciitis, persistent heel pain during ambulation, and had</p>	<p>Subjects ambulated in 5 different test conditions which included: barefoot, baseline shoes with flat insoles, baseline shoes with custom orthoses, rocker shoes with flat insoles, and rocker shoes with custom orthoses.</p> <p>Subjects were blinded to test conditions.</p>	<p>Visual Analog Scale was used to assess pain immediately after ambulating in each test condition.</p> <p>Dynamic plantar pressure redistribution was evaluated by pressure insoles. These pressure insoles had 99 sensors embedded in them that</p>	<p><u>Conclusions:</u> Rocker shoes with custom orthoses demonstrated significantly lower VAS scores and reduced medial heel peak pressure than rocker shoes or custom orthoses alone.</p> <p>This combination produces immediate therapeutic effects on individuals with plantar fasciitis.</p> <p><u>Limitations:</u> Since all 5 conditions were</p>

		“abnormal” foot pronation.		recorded data at a rate of 100Hz.	performed in sequence, subjects’ pain could have been carried over from previous conditions, which could skew data.
Mobilizations					
Cleland et al., 2009 ⁹	<p><u>Purpose:</u> To determine if the combination of manual physical therapy and exercise is more effective than exercise and electrophysical modalities.</p> <p><u>Design:</u> RCT</p>	<p><u>Subjects:</u> 60 patients (42 Females) Mean age 48.4 years</p> <p><u>Inclusion:</u> Between the ages of 18 and 60 years, primary report of heel pain, and a Lower Extremity Functional Scale (LEFS) score less than or equal to 65/80.</p>	<p>Both groups performed specific activities 2 times per week for 2 weeks, followed by 1 time per week for 2 weeks.</p> <p>Each group had an home exercise program that consisted of plantar fascia, soleus, and gastrocnemius stretching and strengthening activities performed 3 times per day for 4 weeks.</p> <p>Electrophysical Agents and Exercise Treatment Approach (EPAX) – Received therapeutic ultrasound followed by iontophoresis with dexamethasone.</p>	<p>Lower Extremity Functional Scale, Foot and Ankle Ability Measure, and Global Rating of Change were used to assess the subjects’ perceived level of function, disability, and improvement.</p> <p>Follow ups were performed at 4 weeks and 6 months.</p>	<p><u>Conclusions:</u> Both groups made improvements but the MTEX group had significant and clinically superior outcomes compared to the EPAX group. The between group difference was also maintained at the 6 month follow up.</p> <p><u>Limitations:</u> Did not track the subjects’ adherence to home exercise program. It is possible that researchers missed potential outcomes by limiting treatment to only 6 visits.</p>

			<p>Manual Physical Therapy and Exercise Approach (MTEX) – Subjects received 5 minutes of aggressive soft tissue mobilization at the triceps surae and insertion of the plantar fascia. Impairment based manual therapy was performed at the hip, knee, ankle, and foot. This was based off clinical decision-making. Home exercise program also included ankle eversion self-mobilizations and manual soft tissue mobilizations of plantar fascia.</p>		
Renan-Ordine et al., 2011 ¹⁰	<u>Purpose:</u> To determine the effectiveness of trigger point manual therapy combined with self-stretching.	<u>Subjects:</u> 60 patients (45 Females) Mean age 44 years	<p>All subjects received treatment 4 days per week for 4 weeks</p> <p>Self-stretching (Str) group- Received a self-</p>	Physical function and bodily pain domains of the Medical Outcomes Study 36-Item Short-Form Health	<u>Conclusions:</u> Combination of self-stretching and TrP manual therapy significantly improved physical function and pain compared to stretching alone. TrP manual therapy group also had a significant group-by-time effect on pain and pressure pain

	<u>Design:</u> RCT	<u>Inclusion:</u> Individuals between the ages of 18 and 60 years and had clinical diagnosis of plantar fasciitis.	stretching protocol that included calf and plantar fascia specific exercises. These were performed 2 times per day. Used intermittent stretching of 20 seconds followed by 20 seconds of rest for a total of 3 minutes for each stretch. Soft tissue TrP manual therapy (Str-ST) group- Received the same stretching protocol with the addition of trigger point pressure release technique in their gastrocnemius musculature. This technique was performed for 3 repetitions of 90 seconds. Subjects also received a neuromuscular technique over the gastrocnemius muscle.	Survey (SF-36). Pressure pain thresholds (PPT) were assessed with a mechanical pressure algometer. Follow up was performed at 4 weeks	threshold. <u>Limitations:</u> Did not have a true control group, readers cannot determine long term effects due the short follow up (4 weeks), and did not use a condition specific outcome measure.
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Taping

Tsai et al., 2010 ¹¹	<u>Purpose:</u> To evaluate the therapeutic effects of kinesiotope on	<u>Subjects:</u> 52 patients (33 females) Mean age 41.6 years	During study, patients did not receive any other treatment.	McGill Pain Questionnaire and Foot Function Index were used to assess	<u>Conclusions:</u> Kinesiotape group demonstrated significantly improved pain and function compared to the control group.
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	<p>plantar fasciitis.</p> <p><u>Design:</u> RCT</p>	<p><u>Inclusion:</u> Individuals with a confirmed diagnosis of plantar fasciitis with symptoms less than 10 months.</p>	<p>Kinesiotape group- Received kinesiotaping along with physical therapy program. Kinesiotape was applied to gastrocnemius and plantar fascia.</p> <p>Control group- Only received physical therapy program.</p> <p>Physical therapy program included therapeutic ultrasound for 5 minutes and low frequency electrotherapy for 15 minutes. Performed 6 times per week for 1 week.</p>	<p>subjects' pain and function.</p> <p>Ultrasound used to assess plantar fascia thickness.</p> <p>Follow up at one week.</p>	<p>Also, had a reduction in plantar fascia thickness compared to control, however there was not a significant difference between groups.</p> <p>Limitations: The physical therapy program consisted of ultrasound and electrotherapy, which has limited evidence to support their use. It would have been more beneficial if other evidenced based interventions were used. Did not address the potential benefits of kinesiotaping past one week. Six visits in one week are not realistic.</p>
<p>Van Lunen et al., 2011¹²</p>	<p><u>Purpose:</u> To determine the effects of augmented low-dye (ALD) compared to a heel-pain orthosis (HPO) in regards to pain and pressure during walking and</p>	<p><u>Subjects:</u> 17 Patients Did not provide patient characteristics.</p> <p><u>Inclusion:</u> Clinical diagnosis of plantar fasciitis.</p>	<p>Patients walked and jogged for 1.5 minutes under 3 conditions, which included: augmented low-dye, heel-pain orthosis, and control.</p>	<p>Peak plantar pressure and mean plantar pressure was assessed with the Pedar in-shoe pressure system.</p> <p>Visual Analog Scale was used to assess pain.</p>	<p><u>Conclusion:</u> Both HPO and ALD produced immediate clinically and statistically significant improvements in pain during walking/jogging.</p>

	running. <u>Design:</u> Cross-over study		Pain was assessed at the 60-second mark. Plantar pressure was assessed after 45 seconds into activity.		<u>Limitations:</u> Researchers were not able to localize pressure data at the midfoot and toes, which skews some of the data's accuracy. Since this was a cross over study, the subjects' pain could have been carried over during walking/jogging in other conditions. Did not assess long term outcomes. No patient characteristics described in study.
Abd El Salam et al., 2011 ¹³	<u>Purpose:</u> To determine the effects of low-dye taping (LDT) compared to medial arch support (MAS) in regards to pain and disability. <u>Design:</u> RCT	<u>Subjects:</u> 30 patients (7 Females) Mean age 52.9 years <u>Inclusion:</u> Diagnosis of unilateral plantar fasciitis, between the age of 40 and 60 years, and non-athletes.	Each group received conventional physical therapy 3 times per week for 3 weeks. This protocol included therapeutic ultrasound (8 minutes, 1.2 W/cm ² , 1 MHz) and calf stretches (5 repetitions with 30 second holds). LDT group- Tape was worn constantly and was changed during physical therapy sessions. MAS group- Support was worn every day during their ADLs.	Manchester Foot Pain and Disability Schedule and Visual Analog Scale was used to assess the subjects' pain related disability. Follow up was performed at 3 weeks.	<u>Conclusions:</u> Both groups demonstrated significant improvements in pain and disability measures. The MAS group had significantly better improvements compared to the LDT group. Effectiveness of the tape wears down with time; however, this is an intervention that would benefit individuals that do not have medial arch support. <u>Limitations:</u> There is limited evidence to support the use of therapeutic ultrasound, therefore another intervention should have been used. Researchers could have assessed the durability of the tape prior to its removal.

Low Level Laser

<p>Kiritsi et al., 2010¹⁴</p>	<p><u>Purpose:</u> To evaluate the effect Low Level Laser Therapy (LLLT) has on plantar fascia pain and thickness.</p> <p><u>Design:</u> RCT</p>	<p><u>Subjects:</u> 30 patients Mean age 41 years</p> <p><u>Inclusion:</u> Unilateral plantar heel pain, clinical diagnosis of plantar fasciitis, and duration of pain greater than 6 weeks.</p>	<p>Treatment was performed 3 times per week for 6 weeks.</p> <p>Experimental group- Received LLLT.</p> <p>Control group- Received identical placebo.</p>	<p>Visual Analog Scale used to assess pain.</p> <p>Ultrasonography used to assess plantar fascia thickness.</p> <p>Follow up was performed at 6 weeks.</p>	<p><u>Conclusions:</u> LLLT group demonstrated a significant improvement in pain during ADLs compared to the placebo. Both groups had a significant reduction in plantar fascia thickness; however, the difference between groups was not significant.</p> <p><u>Limitations:</u> Relatively small sample size.</p>
<p>Macias et al., 2015¹⁵</p>	<p><u>Purpose:</u> To evaluate the effectiveness of low level laser on individuals with chronic plantar fasciitis.</p> <p><u>Design:</u> RCT</p>	<p><u>Subjects:</u> 69 subjects (27 Females) Mean age of 56.7 years</p> <p><u>Inclusion:</u> Ages over 18 years, unilateral plantar heel pain, clinical diagnosis of plantar fasciitis, duration of symptoms longer than 3 months, at least a 50 on the VAS, and failure with conservative treatment.</p>	<p>Treatment was performed twice a week for 6 weeks.</p> <p>Experimental group- Received LLLT.</p> <p>Control group- Received identical placebo.</p>	<p>Foot Function Index and Visual Analog Scale were used to access pain and function limitations.</p> <p>Doppler ultrasonography used to measure fascial thickness.</p> <p>Follow ups were performed at 1, 2, 3, 6, and 8 weeks.</p>	<p><u>Conclusions:</u> LLLT group demonstrated significant improvement in pain compared to the placebo. LLLT group also had a significant reduction in plantar fascia thickness.</p> <p><u>Limitations:</u> Outcomes not assessed beyond 8 weeks. Plantar fascia thickness was assessed with Doppler ultrasonography, which is subject to user error.</p>

Ultrasound

<p>Shanks et al., 2010¹⁶</p>	<p><u>Purpose:</u> To evaluate the effectiveness of therapeutic ultrasound for musculoskeletal conditions of the lower limb.</p> <p><u>Design:</u> Systematic Review</p>	<p><u>Subjects:</u> 10 studies</p> <p><u>Inclusion:</u> randomized or quasi-randomized controlled trials written in English.</p>	<p><u>Experimental group:</u> Therapeutic ultrasound used to treat various lower extremities disorders including heel pain.</p> <p><u>Control:</u> Sham or placebo ultrasound and other treatment modalities.</p>	<p>Studies used varying outcome measures that included Visual Analog Scale, ordinal scale, pain questionnaire, swelling, range of motion, general health questionnaire, and objective assessment of function.</p>	<p><u>Conclusion:</u> There is no high-quality evidence to support the use of therapeutic ultrasound for lower extremity musculoskeletal conditions. None of the included placebo controlled studies were able to find any statistical significant difference between the ultrasound groups and the sham groups.</p> <p><u>Limitations:</u> The literature review was performed by one person, which could cause article selection bias. Did not include articles that were not written in English.</p>
<p>Acupuncture</p>					
<p>Thiagarajah et al., 2017¹⁷</p>	<p><u>Purpose:</u> To determine the effectiveness of pain relief from acupuncture.</p> <p><u>Design:</u> Systematic Review</p>	<p><u>Subjects:</u> n=144, 4 studies</p> <p><u>Inclusion:</u> Randomized controlled trials that compared acupuncture with other treatments or sham acupuncture.</p>	<p><u>Experiment group:</u> Acupuncture therapy.</p> <p><u>Control group:</u> Standard conservative therapy and sham therapy.</p>	<p>Studies used the Visual Analog Scale and plantar fasciitis pain/disability scale.</p> <p>Follow ups varied between 4 and 24 weeks.</p>	<p><u>Conclusions:</u> Acupuncture significantly improved pain between 4 and 8 weeks. Currently there is inadequate evidence supporting its effectiveness long term. Side effects were minimal.</p> <p><u>Limitations:</u> Single reviewer so there could be selection and appraisal bias. Also, reviewer only searched two databases.</p>

Dry Needling

Cotchett et al., 2010 ¹⁸	<p><u>Purpose:</u> To determine the effectiveness of therapeutic dry needling for plantar fasciitis.</p> <p><u>Design:</u> Systematic Review</p>	<p><u>Subjects:</u> n= 53, 3 studies</p> <p><u>Inclusion:</u> Randomized controlled and quasi-experimental studies that used dry needling for heel pain.</p>	<p><u>Experimental group:</u> Received dry needling intervention to the plantar fascia and posterior heel. One study used dry needling along with conservative treatment and two studies with acupuncture.</p> <p><u>Control group:</u> Performed conventional conservative therapy but this treatment protocol was not outlined (only one study included a control group).</p>	<p>Studies used the Visual Analog Scale, Foot Health Status Questionnaire, Foot Function Index, and pressure pain threshold.</p> <p>Follow ups varied between 4 weeks to 24 months.</p>	<p><u>Conclusions:</u> Current evidence for this intervention is of poor quality. Limited evidence to support the effectiveness of dry needling.</p> <p><u>Limitations:</u> Since two of the three studies used dry needling along with acupuncture, it is unclear the true effectiveness of dry needling alone.</p>
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Cotchett et al., 2014 ¹⁹	<p><u>Purpose:</u> To determine the effectiveness of dry needling for plantar fasciitis.</p> <p><u>Design:</u> RCT</p>	<p><u>Subjects:</u> 84 patients (40 females) mean age of 56.1 years.</p> <p><u>Inclusion:</u> Individuals 18 years or older, clinical diagnosis of plantar fasciitis, symptoms for at least 1 month, first step pain of at least 20mm on VAS, and no previous history of dry needling or acupuncture treatment.</p>	<p>Each group received treatment once per week for 30 minutes over a 6-week period.</p> <p>Experimental group received dry needling in myofascial trigger points(MTrPs) located in the soleus, quadratus plantae, flexor digitorum brevis, and abductor hallucis muscles.</p> <p>Authors also addressed MTrPs in muscles that influence lower extremity loading which included the gluteal, adductor, and hamstring musculature.</p> <p>Control group received sham dry needling (non-penetrating acupuncture needles).</p>	<p>Visual Analog Scale, Foot Health Status Questionnaire, Medical Outcomes Study 36-Item Short-Form Health Survey, and 21-Item Short- Form Depression Anxiety and stress scales were used to assess pain, foot function, and overall health status.</p> <p>Follow ups were performed at 2, 4, 6, and 12 weeks.</p>	<p><u>Conclusion:</u> Dry needling provides significant improvement in foot pain and function; however, the results were not statistically significant after 6 weeks. Also, the improvement that was made in regards to their FHSQ score did not meet the MCID.</p> <p><u>Limitations:</u> Potential for bias due to lack of clinician blinding.</p>
Extracorporeal Shockwave therapy					
Lou et al., 2017 ²⁰	<p><u>Purpose:</u> To evaluate the efficacy of extracorporeal shock wave therapy in the treatment of</p>	<p><u>Subjects:</u> n= 1,174, 9 studies</p> <p><u>Inclusion:</u> RCTs that included individuals</p>	<p>Experiment group: Received ESWT.</p> <p>Control group: Only</p>	<p>Studies used the Visual Analog Scale, and Roles and Maudsley score.</p>	<p><u>Conclusion:</u> ESWT is a very effective treatment as evidenced by statistically significant improvements plantar heel pain by 60%, superior functional outcomes, and decreased recovery time. ESWT should be</p>

	<p>recalcitrant plantar fasciitis without local anesthesia.</p> <p><u>Design:</u> Systematic review and Meta-analysis</p>	<p>18 years or older, unilateral plantar fasciitis, symptoms longer than 6 months, VAS score ≥ 5, failed conservative treatment, and Roles and Maudsley score of 3 or 4.</p>	<p>received placebo.</p>	<p>Meta-analysis analyzed data from the 12 week follow up.</p>	<p>used if conservative treatment has failed.</p> <p><u>Limitations:</u> The meta-analysis consisted of a relatively small sample size due to a lack of uniform evaluations. Also, protocols varied among the studies, which could have influenced the results.</p>
Corticosteroids					
<p>David et al., 2017²¹</p>	<p><u>Purpose:</u> To evaluate the benefits and dangers of using corticosteroid injections for plantar fasciitis.</p> <p><u>Design:</u> Systematic review</p>	<p><u>Subjects:</u> n= 2492, 39 studies</p> <p><u>Inclusion:</u> Randomized and quasi-randomized trials that used corticosteroid injections as treatment.</p>	<p>Experimental group: received corticosteroids injections.</p> <p>Control group: 8 studies involved a placebo and the other 31 studies were comprised of various other treatments.</p>	<p>Studies used the Visual Analog Scale, Foot and Ankle Disability Index, Foot Health Status Questionnaire, Maryland Foot and Ankle Scale , American Orthopedic Foot and Ankle Society Ankle and Hind Foot Score, Foot Function Index, and adverse outcomes.</p> <p>Follow ups varied between 4 weeks to 2 years.</p>	<p><u>Conclusion:</u> Overall, there is low quality evidence that suggest corticosteroids may reduce heel pain for up to 4 weeks, but not afterwards. Although rare, adverse effects included plantar fascia rupture, injection pain, infection, nerve injury, erythema, and injection flare. Authors reported that these incidents were likely underreported so more cannot be ruled out.</p> <p><u>Limitations:</u> Majority of studies had a small sample size and high risk of bias.</p>
Platelet Rich Plasma Injections					
<p>Mahindra et al., 2016²²</p>	<p><u>Purpose:</u> To compare the effects of platelet</p>	<p><u>Subjects:</u> 75 patients (44 females)</p>	<p>All groups were instructed not to use NSAIDs for 1</p>	<p>Visual Analog Scale and American</p>	<p><u>Conclusion:</u> Both PRP and corticosteroid injections demonstrated significant</p>

	<p>rich plasma, corticosteroids, and placebo on plantar fasciitis.</p> <p><u>Design:</u> RCT</p>	<p>Mean age 33.3 years</p> <p><u>Inclusion:</u> Individuals with plantar fasciitis that did not respond to at least 3 months of conservative treatment.</p>	<p>month following the injection and were given a calf and plantar fascia stretching protocol.</p> <p>The PRP group, corticosteroid group, and placebo group each received their respective injection (Placebo = saline).</p>	<p>Orthopaedic Foot and Ankle Society Ankle-Hindfoot Scale were used to assess foot pain and function.</p> <p>Follow ups were performed at 3 weeks and 3 months.</p>	<p>improvements in pain and function at 3 weeks. There was a significant difference between the groups, which favored the PRP group in regards to function at 3 months.</p> <p><u>Limitations:</u> Small sample size in each group.</p>
<p>Singh et al., 2017²³</p>	<p><u>Purpose:</u> To compare pain and functional outcomes of platelet rich plasma and corticosteroid injections.</p> <p><u>Design:</u> Systematic Review and Meta-analysis.</p>	<p><u>Subjects:</u> n=517, 10 studies</p> <p><u>Inclusion:</u> RCT, retrospective study, or prospective observational studies that compared PRP injections with corticosteroid injections for plantar fasciitis, included patients with no previous surgical intervention and had failed conservative treatment, had a minimum sample size</p>	<p>All studies included a stretching protocol after injection.</p> <p>Each group received its respective injection.</p>	<p>Studies used the Visual Analogue Score, American Orthopaedic Foot and Ankle Score (AOFAS), Roles Maudsley score, and Foot and Ankle Disability Index, and Foot Health Status Questionnaire.</p> <p>Follow ups varied between 4 weeks to 24 months.</p>	<p><u>Conclusion:</u> PRP injections resulted in superior outcomes in pain and function compared to corticosteroids at 3 months. Long-term evidence is limited.</p> <p><u>Limitation:</u> Only one of the articles included a placebo that confirms the improvements were not caused due to chance.</p>

		of 10, and used a validated quality of life or pain score.			
Surgery					
Wheeler et al., 2014 ²⁴	<p><u>Purpose:</u> To evaluate outcomes following surgical intervention for plantar fasciitis.</p> <p><u>Design:</u> Case series</p>	<p><u>Subjects:</u> 79 patients (48 female) Mean age during procedure 49.5 years</p> <p>Average duration of symptoms was 32 months.</p> <p><u>Inclusion:</u> Individuals that underwent the plantar fasciotomy surgery between 1993 and 2009 at the University Hospitals of Leicester NHS Trust, Leicester, UK.</p>	Open Plantar Fasciotomy	<p>Patient satisfaction and Visual Analog Scale.</p> <p>Follow up varied between 1 and 15.5 years (average, 7.0 years).</p>	<p><u>Conclusion:</u> 84% of respondents were satisfied with their results. Mean postoperative pain improved by 79%. 50% of respondents were pain free after procedure but 10% of them did not improve. None of the respondents reported worse outcomes following procedure.</p> <p><u>Limitations:</u> All of the surgeries were performed by a single surgeon in one hospital, which may limit the generalizability of these findings. Unable to determine conservative therapy that subjects participated in prior to surgery due to missing data.</p>
Chou et al., 2016 ²⁵	<p><u>Purpose:</u> To compare patient outcomes after undergoing endoscopic plantar fasciotomy and open plantar fasciotomy.</p>	<p><u>Subjects:</u> 42 feet/38 patients (31 females) Mean age 51.7 years</p> <p><u>Inclusion:</u> Individuals</p>	<p>Endoscopic Plantar Fasciotomy Procedure (n=14)</p> <p>Open Plantar Fasciotomy Procedure (n=28)</p>	<p>American Orthopaedic Foot and Ankle Society Ankle-Hindfoot Scale, the Medical Outcomes Study, Short-Form, 36-item</p>	<p><u>Conclusion:</u> Subjects that underwent the endoscopic plantar fasciotomy procedure had significantly greater improvements in the function and pain at 3 months compared to the open plantar fasciotomy procedure. Both procedures had similar long-term outcomes.</p>

	<u>Design:</u> Retrospective cohort study	between the ages of 18 and 80 years with chronic plantar fasciitis that has failed conservative management for at least 6 months.		Health Survey, and patient satisfaction and expectations. Follow ups were performed at 3 and 6 months and 1 year.	<u>Limitation:</u> Authors excluded patients from analysis if they missed follow up appointments, which could have biased study toward more motivated individuals. Follow ups longer than 1 year are needed to truly evaluate the long-term success/failure of the procedures.
Weight Loss Counseling					
Butterworth et al., 2012 ²⁶	<u>Purpose:</u> To determine the relationship between body mass index (BMI) and foot disorders and to investigate whether weight loss is effective for reducing foot pain. <u>Design:</u> Systematic Review	<u>Subjects:</u> 25 studies <u>Inclusion:</u> All study designs that examined the association between BMI and musculoskeletal foot pathology. Subjects had to be older than 18 years.		Western Ontario McMaster Osteoarthritis Index score used for pain, stiffness and function. Authors did not report any other pain outcome measures. BMI used to assess body mass.	<u>Conclusion:</u> There is a strong association between increased BMI and chronic plantar heel pain and non-specific foot pain. Reduction in foot symptoms is associated with weight loss but this evidence is limited. <u>Limitation:</u> Limited evidence to support weight loss for reducing symptoms of heel pain. Some studies did not specify the foot disorder associated with each individual's pain, which limits the interpretation of these results.
Frey and Zamora, 2007 ²⁷	<u>Purpose:</u> To compare the incidence of orthopedic foot and ankle complaints with body mass index (BMI).	<u>Subjects:</u> 1411 subjects (881 female) <u>Inclusion:</u> Individuals over the age of 18		BMI used to assess body mass.	<u>Conclusion:</u> Being overweight or obese increases the likelihood by 1.4 times of developing plantar fasciitis, which is not statistically significant. It did significantly increase the likelihood of developing tendinitis.

	<u>Design</u> : Survey	that had a foot/ankle pathology diagnosed by an orthopedic foot and ankle specialist.			<u>Limitation</u> : Authors did not discuss the likelihood difference of developing a foot/ankle condition between the overweight and obese subjects. No patient characteristics were described in the study other than BMI and gender.
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