Article Title/ Author/Year	Article Type	Subjects (Number and Criteria)	Outcome Measures and Timeframes	Interventions or Methods	Results	Conclusions
Interventions for the Management of Acute and Chronic Low Back Pain: Revision 2021 George et al. 2021	Clinical practice guideline	N/A	N/A	Experts were appointed by the orthopedic section of the ATPA to systematically review literature related to exercise, manual and other-directed therapies, classification systems, and patient education for low back pain. Guidelines were developed and reviewed by multiple parties. Relevant to this capstone project are recommendations based on review of research related to dry needling interventions.	Review of 3 RCTs provided conflicting evidence about the efficacy of DN compared to other interventions for improving pain and disability in the short term (immediately after treatment to 2 months post-treatment); 2 RCTS demonstrated greater improvements with DN while one RCT demonstrated no significant differences between treatments.	Based on weak (grade C) evidence, physical therapists can consider using DN in conjunction with other treatments to reduce short-term pain and disability among patients with chronic low back pain.

Evidence for Dry Needling in the Management of Myofascial Trigger Points Associated With Low Back Pain: A Systematic Review and Meta-Analysis Liu et al. 2018	Systematic review and meta-analysis	11 RCTs included Inclusion criteria: RCTs, patients diagnosed with LBP and trigger points, DN alone as intervention, examined pain intensity and/or functional disability Exclusion criteria: trigger points not defined using Simons et al. criteria, DN plus acupuncture intervention, different types of DN compared to each other, no full text, no available data	Meta-analysis examined outcomes including pain intensity and functional disability immediately after intervention and after follow-up between treatment groups. Most studies used VAS to measure pain intensity and RMDQ and ODI to measure disability. Follow-up periods ranged from 20 days to 9 weeks.	Intervention groups received DN alone. Comparison groups received other interventions including superficial DN, acupuncture, sham dry needling, super laser therapy, standard physical therapy, local anesthetic injection, and DN plus neuroscience education.	DN alone significantly improved pain intensity (I2=94%; SMD, -1.06; 95% CI, -1.77 to -0.36; P=0.003) and functional disability (I2=88%; SMD, -0.76; 95% CI, -1.46 to -0.06; P=0.03) compared to other treatments immediately at post intervention. Compared with other treatments, DN resulted in 1.56 cm (95% CI, 0.67-2.44 cm, p=0.0006) improvement in VAS scores, 2.32-point (95% CI, 0.02-4.66 points, p=0.05) improvement in RMDQ scores, and a 4.41-point (95% CI, 0.44-8.38 points, p=0.03) improvement in ODI score.	Moderate quality evidence demonstrates that DN is beneficial for significantly and meaningfully improving pain intensity of LBP immediately after treatment compared to other treatments. While DN can also significantly improve functional disability in this time period compared to other treatments, improvements are not clinically meaningful. No significant or meaningful effects of DN were observed at follow up.

					There were no significant differences between DN and other treatments at follow-up in regards to pain intensity (I2=83%; SMD, -0.43; 95% CI, -1.17 to 0.30; P=0.25) or functional disability measured by the RMDQ (I2=68%; MD, -0.32 points; 95% CI, -2.08 to 1.45 points; P=0.73). One study found significant improvements in ODI scores from DN alone (MD, -8.10 points; 95% CI, -13.10 to -3.10 points; P=0.001) When comparing DN alone to DN plus other treatments, DN	

					alone significantly improved pain intensity (I2=0%; SMD, 0.83; 95% CI, 0.55-1.11; P<.00001), but not functional disability (I2=0%; SMD, 0.13; 95% CI, -0.14 to 0.40; P=0.36) immediately after treatment.	
Is dry needling effective for low back pain? A systematic review and PRISMA-compliant meta-analysis Hu et al. 2018	Systematic review and meta-analysis	16 RCTs included Inclusion criteria: RCTs and quasi-RCTs, adults (18+) with subacute (< 12 weeks) or chronic (>12 weeks) LBP and trigger points, DN (alone or in combination with other treatments) as intervention, controls including acupuncture, sham, or other active treatments, examined pain	Meta-analysis examined outcomes such as pain intensity (VAS) and functional disability (RMDQ and ODI). Quantitative review was performed examining DN versus other treatments. Outcomes were measured at post-treatment and at follow up ranging from 1 to 12	Intervention groups received DN with varied treatment protocols. Control groups received acupuncture, sham needling, or other active interventions such as trigger point injections, laser irradiation, DN plus neuroscience education, DN plus acupuncture,	DN significantly improved post-intervention pain intensity (SMD = –2.74, 95% CI: –3.77 to –1.71, I2 = 26%) and functional disability (SMD = –1.70, 95% CI: –2.59 to –0.81, I2 = 34%) compared to sham needling. DN significantly improved follow up pain intensity (SMD = –1.05, 95% CI: –1.70 to –0.40, I2 = 0%) but not functional	DN is more effective than sham needling and acupuncture for improving pain intensity and functional disability at post-intervention. Compared to other treatments, DN demonstrates variable superiority in these outcomes at post-intervention and follow up.

		intensity and functional disability Exclusion criteria: LBP due to infection, neoplasm, metastases, fractures, or pregnancy, non-RCTs, no available data, intervention included both DN and acupuncture, comparison of two types of DN	weeks post-treatment.	and standard physical therapy.	disability (SMD = –0.58, 95% CI: –1.19 to 0.04, I2 = 0%) compared to sham needling. DN significantly improved post-intervention pain intensity (SMD = –0.96, 95% CI: –1.80 to –0.12) and functional disability (SMD = –0.63, 95% CI: –0.99 to –0.26, I2 = 0%) compared to acupuncture. DN did not significantly improve follow-up pain intensity (SMD = –0.47, 95% CI: –1.04–0.09, I2 = 0%) or functional disability (SMD = –0.10, 95% CI: –0.65 to 0.45, I2 = 0%) compared to acupuncture.	

					At post-intervention, DN provided statistically significant benefits in pain reduction compared to some interventions (injection and physical therapy) but not others (injection, DN plus neuroscience education, laser, acupuncture and DN). No significant differences in favor of DN were observed. At follow up, DN provided statistically significant benefits in pain reduction and functional disability compared to physical therapy, but not laser therapy.	

Effectiveness of dry needling versus a classical physiotherapy program in patients with chronic low-back pain: a single-blind, randomized, controlled trial Tüzün et al. 2017	Randomized control trial	34 patients included Inclusion criteria: age 35-70 years, LBP at least 3 months duration, diagnosed with lumbar disc herniation, at least one active trigger point Exclusion criteria: neurologic symptoms, orthopedic problems in lower extremities or low back, sacroiliac joint problems, lumbar spondylolisthesis, neurologic/rheumatic/oncological problem, physical therapy in the past 6 months, corticosteroid or oral medication, needle phobia	Pain intensity measured with short form of McGill Pain Questionnaire, number and PPT of trigger points assessed with palpation, depression assessed with Beck Depression Inventory, fear of movement measured by Tampa Kinesiophobia Scale. Outcomes measured at baseline and on the last day of treatment.	Intervention group received DN plus Swedish massage for 10 minutes. DN was performed on active or latent trigger points in the gluteus medius, quadratus lumborum, multifidus, and erector spinae muscles using the injection technique and left in place for 20 minutes. DN was applied 2 times per week for a total of 6 sessions. Treatment was performed by a physical therapist. Control group performed a home exercise program twice per day and	After treatment, patients in the intervention group demonstrated statistically significant improvements in pain intensity ($P<0.001$), trigger point number and sensitivity ($p<0.0001$), and fear of movement (0.018) compared to patients in the control group. There were no significant post-treatment differences in depression ($p=0.678$).	Compared to control treatments, DN plus massage can significantly improve pain intensity, trigger point number and sensitivity, and kinesiophobia in patients with LBP due to lumbar disc herniation immediately after treatment.

				received hot pack for 20 minutes, TENS for 25 minutes and 6 sessions, and ultrasound for 6 minutes and 10 sessions.		
A randomized clinical trial comparing non-thrust manipulation with segmental and distal dry needling on pain, disability, and rate of recovery for patients with non-specific low back pain Griswold et al. 2019	Randomized control trial	65 patients included Inclusion criteria: 18-70 years old, LBP for at least 6 weeks, non-specific low back pain, >20% on ODI Exclusion criteria: unable to provoke LBP, <2/10 24-hour average pain on NPRS, red flags for tumor, metabolic disease, RA, osteoporosis, prolonged steroid use, prior lumbar surgery, significant nerve root compression,	Outcomes included the ODI, patient specific functional scale, NPRS, and PPT. Outcomes were measured at baseline and the conclusion of treatment.	Intervention group received segmental and distal DN. Segmental DN was performed at paraspinal levels and distal DN was performed in dermatomes of the lower extremity. 22 needles were inserted each visit for 5-7 minutes. Control group received non-thrust manipulation for three bouts of 45 seconds. Both groups received treatment for 6	There were no significant between group differences for the ODI (p=0.57), patient specific functional scale (p=0.26), NPRS (p=0.69), or PPT (p=0.51). Both groups significantly improved their ODI, patient specific functional scale, and NPRS scores (p=0.009-0.018) but not PPT (p=0.20) over the course of treatment.	There were no statically significant or clinically meaningful between group differences regarding outcomes. Both intervention and control groups demonstrated significant and meaningful changes in pain and disability, but not PPT, over the course of therapy; both treatment methods are equally effective for patients with non-specific LBP.

		or current pregnancy, transmissible blood disease, chronic regional pain syndrome, seeking litigation, non-English speaking, fibromyalgia		sessions over 3 weeks. Both groups also performed a home exercise program of mobility and stability exercises for the lumbo-pelvic area. Both groups were treated by physical therapists with over 9 years' experience.		
Dry Needling Versus Cortisone Injection in the Treatment of Greater Trochanteric Pain Syndrome: A Noninferiority Randomized Clinical Trial Brennan et al. 2017	Randomized control trial	43 participants included Inclusion criteria: 18+ years old, diagnosed with lateral hip pain/greater trochanteric pain syndrome, active email account Exclusion criteria: LBP associated with hip pain, motor and/or sensory	Outcome measures included the NPRS and patient specific functional scale. Outcomes were measured at baseline, and 1, 3, and 6 weeks following initial treatment.	Intervention group received DN by an experienced physical therapist. Technique and number of follow ups varied between patients. Needling occurred in a number of hip muscles, with the goal of eliciting a local twitch response, and	At 6 weeks, DN was not inferior to cortisone injections in regards to pain intensity (difference, –1.12; 95% CI: –2.99, 0.74; $p<0.01$) or function (difference of 0.2 ; 95% CI: –0.57, 0.96; $P<0.01$).	DN is equally effective as cortisone injections for improving pain intensity and function among patients with greater trochanteric pain syndrome.

		impairment similar to radiculopathy, infection or malignancy of hip, connective tissue disease, non-English speaker, pregnancy		were left in situ for 5-7 minutes. Control group received cortisone injection (2 mL methylprednisolone acetate (Depo-Medrol; Pfizer Inc, New York, NY), 40 mg/mL; 4 mL 1% lidocaine; 4 mL 0.25% marcaine (10 mL total)) by orthopedic surgeons or physicians' assistants. Technique and number of follow ups varied between patients. Treatments occurred over 6 weeks.		
Patellofemoral Pain Willy et al. 2019	Clinical practice guideline	N/A	N/A	Experts were appointed by the orthopedic section of the ATPA to systematically	Review of 2 high quality RCTs demonstrated that DN does not improve pain or disability/function	Based on strong (grade A) evidence, physical therapists should not use dry needling to treat

				review literature related to classification, examination, and intervention strategies for patellofemoral pain syndrome. Guidelines were developed and reviewed by multiple parties. Relevant to this capstone project are recommendations based on review of research related to dry needling interventions.	in patients with patellofemoral pain syndrome compared to sham treatment or other treatments like exercise and manual therapy.	patients with patellofemoral pain syndrome.
A Systematic Review of Clinical Practice Guidelines for Physical Therapist Management of Patellofemoral Pain Wallis et al. 2021	Systematic review of clinical practice guidelines	4 CPGs included Inclusion criteria: CPG, recommendation for physical therapist management of patellofemoral pain Exclusion criteria: recommendation	N/A	Systematic review of 5 databases conducted, and CPGs reviewed for inclusion. Relevant to this capstone project are recommendations from included CPGs based on review of research related	Two high quality CPGs do not recommend using DN to treat patellofemoral pain syndrome. One lesser quality CPG recommended considering the use of DN to improve	Higher quality CPGs suggests that DN should not be used to treat patellofemoral pain syndrome, though this conflicts with one lower quality CPG.

		for other conditions		to dry needling interventions.	muscle/tissue flexibility.	
Effects of Trigger Point Dry Needling for the Management of Knee Pain Syndromes: A Systematic Review and Meta-Analysis Rahou-El-Bachiri et al. 2020	Systematic review and meta-analysis	10 RCTs included 6 studies examined patellofemoral pain, 2 knee osteoarthritis, 2 post-surgical knee pain Inclusion criteria: RCTs, adult (19+) human subjects, knee pain of musculoskeletal origin, one group receive DN, one group receive no intervention, sham/placebo intervention, or other interventions, examine pain and pain related disability Exclusion criteria: acupuncture, knee pain related to neurologic	Primary outcomes included knee pain intensity (VAS or NPRS) or related disability (disease specific questionnaire).	Intervention groups received DN with the goal of eliciting a local twitch response. There were variations in the number and frequency of sessions. Physical therapists performed needling in 8 of the 10 studies. Control groups received no intervention, sham or placebo interventions, or other interventions such as routine physical therapy, exercise, manual therapy, stretching, and ultrasound.	Compared to other no intervention, sham or placebo interventions, and other interventions, DN significantly reduced pain (SMD −0.53, 95% CI −0.87 to −0.19, p=0.002) and related disability (SMD −0.58, 95% CI −1.08 to −0.09, p = 0.02) in the short term. Pain reduction was only significantly achieved among patients with patellofemoral pain syndrome (SMD −0.64, 95% CI −1.17 to −0.11; mean difference	Low-to-moderate quality evidence that DN improves pain and related disability in the short-term among patients with knee pain compared to no intervention, sham or placebo interventions, or other interventions. It is recommended that DN be used to decrease pain in patients with patellofemoral pain syndrome.

		disorders or of non-musculoskeletal origin, not published, retrospective designs, pilot studies, use of injection therapy			of −0.92 95% CI −1.64 to −0.21). No significant between group differences were observed in pain intensity or disability at mid- or long-term follow ups.	
Efficacy of quadriceps vastus medialis dry needling in a rehabilitation protocol after surgical reconstruction of complete anterior cruciate ligament rupture Velázquez-Saornil et al. 2017	Randomized control trial	44 patients included Inclusion criteria: 18-55 years old, subacute (7-21 days) post-surgical reconstruction of complete ACL tear, 1 active trigger point in vastus medialis of involved limb Exclusion criteria: neuropathic pain in lower limb, lumbosacral radiculopathy, saphenous nerve entrapment, meralgia	Outcomes included pain intensity (VAS), ROM (goniometer), stability (star excursion balance test), and functionality (Western Ontario and McMaster Universities Osteoarthritis Index). Outcomes were measured at baseline, and immediately, 24 hours, 1 week, and 5 weeks after the first treatment.	Intervention group received DN in addition to rehabilitation protocol. DN was applied only one time on the first day of treatment. DN was performed in the vastus medialis on the affected limb using the Hong fast in and out technique and resulted in a local twitch reaction. Control group received rehabilitation protocol only. The	Compared to the control group, participants in the intervention group demonstrated significantly improved knee ROM in the short term (immediately, 24 hours, and 1 week after treatment) and functionality in the short and medium terms (also at 5 weeks after treatment). Additionally, pain intensity was significantly increased in the	DN in addition to a standard protocol can significantly improve knee ROM and functionality in the short-term, and mid-term for the latter, compared to the standard protocol alone among patients post-ACL reconstruction.

		paresthetica, fractures, rheumatoid or systemic conditions, other surgeries, post-surgery complications, belonephobia, leg length discrepancy, fibromyalgia, hypothyroidism, iron deficiency		rehabilitation protocol was performed Monday through Friday for 5 weeks and consisted of manual passive and active assisted joint mobilization, isometric contractions of the quadriceps and hamstrings, quadriceps electrical stimulation, closed kinetic chain strengthening eccentric exercises, open kinetic chain strengthening concentric exercises, proprioceptive exercises, cycle ergometry, and walking aerobic exercise. Both groups were treated by a	DN group compared to the control group immediately after treatment. No other statistically significant between group differences were observed at other time points or for other measures.	

				physical therapist with over 6 years of experience.		
THE EFFECTIVENESS OF DRY NEEDLING AND STRETCHING VS. STRETCHING ALONE ON HAMSTRING FLEXIBILITY IN PATIENTS WITH KNEE PAIN: A RANDOMIZED CONTROLLED TRIAL Mason et al. 2016	Randomized control trial	39 patients included Inclusion criteria: 18-40 years old, Department of Defense beneficiaries, atraumatic knee pain for greater than 2 weeks, deficit of at least 20 degrees of knee extension on active knee extension test Exclusion criteria: history of herniated lumbar disc or radiculopathy, prior surgery in back, hip, or knee, pregnant, history of blood born pathogens/infections, metal allergy, positive instability tests,	Outcomes included hamstring flexibility (active straight leg raise and active knee extension), squat ROM (goniometer), knee pain (VAS), and function (Lower Extremity Functional Scale). Outcomes measured at baseline, and immediately, 1, 3, and 7 days after the initial treatment.	Intervention group received DN plus standard stretching program. Patients received 2 sessions of DN three days apart to all detected trigger points in biceps femoris, semitendinosus, and semimembranosis. A pistoning technique was used with the goal of eliciting a local twitch response by a provider with 3 years of DN experience. Control group received sham DN plus standard stretching program. Sham DN was performed at	No significant between group differences were observed in regards to the active knee extension ($F = 0.83$, $p = 0.51$), active straight leg raise ($F = 0.29$, $p = 0.89$), deep squat ROM ($F = 0.69$, $p = 0.60$), pain ($F = 0.58$, $p = 0.67$) and self-reported function ($F = 1.73$, $p = 0.17$). Participants in both groups demonstrated significant improvements in all outcomes at final follow-up compared to baseline.	2 sessions of DN in addition to stretching did not result in significant improvements in hamstring flexibility, squat ROM, knee pain, or knee function compared to sham DN in addition to stretching among adults with atraumatic knee pain.

		joint line tenderness or positive meniscal tests, non-English speakers, previously received DN, bleeding disorder, using anticoagulants		three points over both medial and lateral hamstrings. Sham DN was performed again 3 days later. Hamstring stretches were performed 3 times daily for 1 week.		
Dry Needling for Hamstring Flexibility: A Single-Blind Randomized Controlled Trial Alaei et al. 2021	Randomized control trial	44 patients included Inclusion criteria: 18-40 years old, hamstring shortness of >20 degrees as measured by the active knee extension test Exclusion criteria: history of orthopedic or neurologic conditions in lower extremity, low back pain currently or in the past year, low back, hip, or knee	Outcomes included hamstring flexibility, muscle compliance, peak passive torque, and stretch tolerance (all measured during active knee extension test). Outcomes were measured at baseline, immediately, and 15 minutes after the intervention.	Intervention group received a single session of DN, in which 3 points on the hamstrings were DN using a fast in and out technique for 1 minute each. Control group received a single session of static stretching of the hamstrings, in the active knee extension test position for 3 sets of 30 seconds.	There was a significant group by time interaction in favor of the DN group for muscle compliance ($F = 10.72$, $P < 0.001$) and stretch tolerance ($F = 15.98$, $P < .001$). No significant group by time interactions observed for hamstring flexibility ($F = 1.51$, $P = 0.23$) or passive peak torque ($F2,76 = 0.8$, $P = 0.43$).	Single sessions of both DN and static stretching can significantly and meaningfully improve hamstring flexibility, although no significant differences exist between interventions.

		surgery, recent hamstring strain, contractures in lower extremities, contraindications for stretching or DN, not willing to participate		Physical therapists applied all treatments.	Both groups experienced significant and meaningful differences in hamstring flexibility 15 minutes after the intervention (F= 310.21, P < 0.001).	
Ankle Stability and Movement Coordination Impairments: Lateral Ankle Ligament Sprains Revision 2021 Martin et al. 2021	Clinical practice guideline	N/A	N/A	Experts were appointed by the orthopedic section of the ATPA to systematically review literature related to classification, examination, and intervention strategies for ankle stability and movement coordination impairments including lateral ankle ligament sprains. Guidelines were developed and reviewed by	Review of 2 RCTs suggests that DN alone or in combination with proprioceptive training of fibularis muscles can improve strength, balance, pain, and function in patients with chronic ankle instability or history of ankle sprain.	Based on weak (grade C) evidence, physical therapists may perform DN of the fibularis muscle group in addition to proprioceptive training to reduce pain and improve function in patients with chronic ankle instability.

				multiple parties. Relevant to this capstone project are recommendations based on review of research related to dry needling interventions.		
Achilles Pain, Stiffness, and Muscle Power Deficits: Midportion Achilles Tendinopathy Revision 2018 Martin et al. 2018	Clinical practice guideline	N/A	N/A	Experts were appointed by the orthopedic section of the ATPA to systematically review literature related to classification, examination, and intervention strategies for Achilles pain, stiffness, and muscle power deficits related to midportion Achilles tendinopathy. Guidelines were developed and reviewed by multiple parties. Relevant to this	Review of one prospective cohort study and one case series demonstrated that DN in combination with tendon injection and/or eccentric exercise may improve patient pain and satisfaction.	Based on expert opinion (grade F evidence), clinicians may use dry needling and injection under ultrasound guidance in addition to eccentric exercise to decrease pain in patients with Achilles tendinopathy and increased tendon thickness greater than 3 months.

				capstone project are recommendations based on review of research related to dry needling interventions.		
Heel Pain—Plantar Fasciitis: Revision 2014 Martin et al. 2014	Clinical practice guideline	N/A	N/A	Experts were appointed by the orthopedic section of the ATPA to systematically review literature related to classification, examination, and intervention strategies for heel pain or plantar fasciitis. Guidelines were developed and reviewed by multiple parties. Relevant to this capstone project are recommendations based on review of research related to dry	Review of one systematic review suggests that DN to the medial head of the gastrocnemius, soleus, tibialis posterior, popliteus, abductor hallucis, fibularis longus, and flexor digitorum brevis does not significantly improve pain intensity among patients with planar heel pain compared to physical agents and home exercises, but does significantly reduce treatment duration.	Based on expert opinion (grade F evidence), DN cannot be recommended to treat patients with heel pain or plantar fasciitis.

				needling interventions.		
Is Dry Needling Effective for the Management of Plantar Heel Pain or Plantar Fasciitis? An Updated Systematic Review and Meta-Analysis Llurda-Almuzara et al. 2021	Systematic review and meta-analysis	6 RCTs included Inclusion criteria: RCTs, adult (18+) patients with trigger points and associated plantar heel pain, one group received DN, comparison group received no intervention, sham needling, or another intervention, examined pain intensity and related disability Exclusion criteria: plantar heel pain related to neurologic disorders or of non-musculoskeletal origin, not published as full text, acupuncture or wet needling used	Outcomes included pain intensity (VAS or NPRS) and pain related disability (foot function index or Foot Health Status Questionnaire).	Intervention groups received DN for a mean of 4 sessions to the plantar fascia and/or triceps surae musculature. Control groups received no intervention, sham needling, or another intervention including corticosteroid injections, extracorporeal shockwave therapy, stretching and massage, or sham DN.	3 sessions of DN significantly reduces pain intensity in the short term (MD -1.70 points, 95% confidence interval [CI] -2.80 to -0.60; SMD -1.28, 95% CI -2.11 to -0.44, p <0.001) compared to other treatment groups. DN improves pain intensity (MD -1.77 points, 95% CI -2.44 to -1.11; SMD -1.45, 95% CI -2.19 to -0.70 p=0.0001) and related disability (SMD -1.75, 95% CI -2.22 to -1.28, p=0.0001) in the long term compared to other treatment groups.	Moderate- to low-quality evidence suggests that DN can improve pain intensity in the short- and long-term and pain-related disability in the long- term among patients with heel pain compared to other treatment interventions.

Effectiveness of Deep Dry Needling vs Ischemic Compression in the Latent Myofascial Trigger Points of the Shortened Triceps Surae from Triathletes on Ankle Dorsiflexion, Dynamic, and Static Plantar Pressure Distribution: A Clinical Trial Benito-de-Pedro et al. 2019	Randomized control trial	34 patients included Inclusion criteria: triathletes who trained 15-18 hours per week, clinical diagnosis of latent trigger points in triceps surae musculature (presence of taut band, hypersentivie point, and referred pain), and shortened triceps surae musculature Exclusion criteria: <18 or >75 years old, positive neurologic screen for lower extremity disorders and	Outcomes included ankle dorsiflexion ROM (goniometer) and distribution of dynamic and static plantar pressures (T plate platform). Outcomes were measured before treatment, and after 5, 10, 15, 20, and 15 minutes of treatment.	Intervention group received a single session of deep DN in a latent trigger point in the triceps surae musculature using the Hong fast in and out technique. Control group received a single session of ischemic compression in a latent trigger point in the triceps surae musculature.	No statistically significant differences were observed between groups regarding ankle dorsiflexion ROM, static plantar pressures, or dynamic plantar pressures ($p > 0.05$).	DN is not more beneficial than ischemic compression in improving ankle dorsiflexion ROM or static or dynamic plantar pressures in triathletes with shortened triceps surae musculature. Ischemic compression is recommended as treatment for these patients, as it has decreased risk of pain and infection compared to DN.

		neuropathic pain, cognitive alternations, anticoagulant or anti-aggregate medication, injuries to lower extremity, lower extremity prothesis, systemic or local infection, autoimmune disease, hypothyroidism, fibromyalgia, iron deficiency, fear of needles, contraindications to DN				

Abbreviations: RCT (randomized control trial), DN (dry needling), LBP (low back pain), VAS (visual analogue scale), RMDQ (Roland-Morris Disability Questionnaire) ODI (Oswestry Disability Index), PPT (pain pressure threshold), NPRS (numeric pain rating scale), CPG (clinical practice guideline), ROM (range of motion)

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