Proceedings of the 6th International Conference on Biological Engineering and Medical Science
DOI: 10.54254/2753-8818/2026.36262

Physical Therapy for Plantar Fasciitis in Athletic Population: A Review of Research Progress

Ziyi Feng

CDUTCM-KEELE Joint Health and Medical Sciences Institute, Chengdu University of Traditional Chinese Medicine, Chengdu, China
feng.ziyi@stu.cdutcm.edu.cn

Abstract. In recent years, the use of various physical therapy interventions for treating heel pain and plantar fasciitis has attracted increasing attention. However, current reviews related to physical therapy for plantar fasciitis have mainly focused on the general population. These reviews are without consideration of the return-to-sport needs of athletic populations, and there remains a lack of systematic review and comprehensive discussion for addressing plantar fasciitis in athletic populations. This review searched databases including PubMed, Google Scholar, and Cochrane to compare the biomechanical mechanisms of heel pain and plantar fasciitis between athletic and general populations, and to summarize and evaluate clinical studies on various physical therapy interventions (such as extracorporeal shock wave therapy, dry needling, and resistance training combined with stretching) for treating heel pain and plantar fasciitis in athletic populations. The review highlights the short- and long-term effectiveness of extracorporeal shock wave therapy in relieving pain and improving the biomechanical characters of the plantar fascia in athletic populations. Nevertheless, the findings also showed that although clinical studies have demonstrated significant therapeutic effects of resistance training, stretching, and dry needling for plantar fasciitis in athletic populations, the evidence level remains low due to limitations in sample size, intervention design and study methodology. Future research should continue to investigate the biomechanical specificity of plantar fasciitis in athletic populations. Clinical studies should include larger sample sizes, conduct research across different types of sports populations, employ combined physical therapy interventions, and apply long-term follow-up assessments.

Keywords: plantar fasciitis, physical therapy, athletic populations

1. Introduction

Plantar fasciitis is a degenerative (rather than primarily inflammatory) musculoskeletal condition that can be seen in people with different ages and activity levels. The origin of the plantar fascia (the medial tubercle of the calcaneus) is where the lesion located at [1]. Prevalence data reports that 10% of the general population are affected by plantar fasciitis and adults aged 40 to 60 years old are most likely to be affected by it [2]. In statistic, about 80% of patients are employed and physically active adults aged between 25 and 65 years [2]. Meanwhile, in sedentary populations, a higher body mass

DOI: 10.54254/2753-8818/2026.36262

index (BMI) is a risk factor for developing plantar fasciitis [3]. In addition, there is a higher prevalence in plantar fasciitis among athletic populations: a particularly high ratio of up to 17.4% in runners [2]. Even some other studies have reported a prevalence of up to 25% among runners [4]. It is worth noting that among the common overuse injuries in runners, plantar fasciitis ranks third and it accounts for approximately one in ten running-related conditions [5].

According to the conclusions of the 2023 revised Heel Pain—Plantar Fasciitis Clinical Practice Guidelines by the American Physical Therapy Association (APTA), resistance training, plantar fascia stretching, orthotic devices, and dry needling are considered validated physical therapy interventions [6]. Although extracorporeal shock wave therapy (ESWT) was not included in the guideline due to exceeding the scope of practice for U.S. physical therapists, this does not mean ESWT is an ineffective and low-evidence physical therapy intervention for plantar fasciitis. A high-evidence meta-analysis and systematic review showed that extracorporeal shock wave therapy (ESWT) has significant effects in improving plantar fasciitis symptoms and foot function in both the short and long term [7].

However, most of the evidence for the previously mentioned and other physical therapy interventions comes from studies conducted in the general population. Research in athletic populations remains limited, and the evidence foundation is still insufficient. This study aims to synthesize relevant data on physical therapy interventions for plantar fasciitis or plantar heel pain (plantar fasciitis being a common cause of plantar heel pain, while the latter being the broader term [8]), discussing research progress on physical therapy in treating plantar fasciitis or plantar heel pain in athletic populations, evaluating their applicability to athletic populations, and providing more individualized treatment recommendations for this population. In addition, in this study, the requirement of returning to sports and biomechanic specificity in athletic populations are taking into consideration when discussing the therapeutic interventions. Lastly, suggestions for future research directions are given based on some particular prospectives related to athletic populations.

2. The specificity of plantar fasciitis in athletic populations

Generally, plantar fasciitis is regarded as a degenerative overuse condition, and its underlying pathological mechanism is essentially the same in both the general population and athletic populations—repetitive microtrauma at the insertion of the plantar fascia on the medial calcaneal tuberosity leads to collagen degeneration [9]. However, previous biomechanical studies on heel pain have mainly focused on the general population and research specific to athletic populations is limited, which means many findings cannot be directly generalized and developed [10]. For example, high BMI is a risk factor for plantar fasciitis in the general population. However, this risk factor needs to be reconsidered in conjunction with the impact forces experienced during sport in athletic populations who usually possess a lower body fat ratio [10]. Also, from the findings of this article that middle-distance runners had a higher risk of heel pain than long-distance runners, the authors inferred that running speed may be an important contribution to the plantar heel pain, rather than merely the total duration of ground contact or running distance [10].

A study on the pathomechanics of plantar fasciitis reported that during gait, loads on the plantar fascia reach to about 1.5 to 2.8 times body weight [11]. Moreover, peak loading generally occurs during the propulsive phase, consistent with the windlass mechanism of the plantar fascia [11]. A 2023 study examined gait and biomechanics in runners with plantar fasciitis and found that runners with heel pain exhibited a significantly increased range of motion (ROM) in lateral midfoot eversion during early stance phase [12]. During propulsive phase, in male runners with heel pain, significant increases could be observed in medial midfoot eversion ROM, medial midfoot dorsiflexion ROM,

DOI: 10.54254/2753-8818/2026.36262

and medial forefoot plantarflexion ROM, whereas a significant decrease of medial forefoot plantarflexion ROM appeared in female runners with heel pain. This suggests that degeneration of the plantar fascia results in insufficient tension during the windlass-activated propulsive phase, failing to maintain arch support during the preloading phase [12]. These theoretical findings may also suggest that physical therapy such as orthotic devices and intrinsic foot muscle training can be beneficial interventions for athletes, and that both interventions align relatively well with the typical training modes of athletic populations.

To sum up, for the general population, the main risk factors for plantar heel pain include exceeded body mass index, prolonged sitting and prolonged standing, whereas in athletic populations, risk is intended to associated with improper training loads, changes in footwear, or limited ankle dorsiflexion [10, 11]. Therefore, the management of plantar fasciitis should incorporate management in training load and re-education in movement as core components of treatment, rather than relying solely on passive interventions [13]. Furthermore, the needs to return to sport, as well as the expectations regarding treatment timelines in the athletic population should also be taken into accounts.

3. Conventional physical therapy for plantar fasciitis in athletic populations

Among the physical therapy interventions used for heel pain and plantar fasciitis in athletic populations, conventional approaches include extracorporeal shock wave therapy, resistance training, stretching, and dry needling.

3.1. Extracorporeal shock wave therapy (ESWT)

Extracorporeal shock wave therapy (ESWT) is a non-invasive medical technique that delivers high-amplitude, short-duration acoustic shock waves into body tissue, and it includes various biological effects to achieve therapeutic outcomes.

A prospective study enrolled 39 recreational runners with plantar fasciitis, collecting baseline data before ESWT treatment, administering the ESWT intervention, and evaluating outcomes around 5 years later through telephone follow-up [14]. The results showed that ESWT had a strong effect size ($r \approx 0.84$–0.88) in significantly reducing VAS pain scores and improving AOFAS functional scores, with patients reporting sustained symptom relief even 5 years after treatment. Over the 5-year period, the median VAS score decreased from 8 to 1.5–2 points, representing a reduction of up to 81%, with this improvement in pain reaching statistical significance ($p<0.0001$). Notably, the combination of ESWT with pretreatment included ultrasound and laser showed slightly better overall outcomes compared with ESWT alone. However, the ESWT-alone group demonstrated a faster onset of effect: about 70% of patients reporting improvement after the first treatment [14]. Another randomized controlled trial enrolled 62 recreational runners aged 45–60 years and compared the analgesic effects and extent of fascial biomechanical improvement between a fixed-parameter rESWT (radial extracorporeal shock wave therapy) protocol and a dose-escalation protocol that progressively increased the pressure and number of impulses in treating plantar fasciitis [15]. The results showed that, at 1 month after treatment completion, the dose-escalation group exhibited significantly superior analgesic effects compared with the fixed-parameter group (VAS difference ≈ 20 mm, $p<0.001$), and plantar fascia stiffness continued to deccline in the dose-escalation group (from 27.69 to 26.03 Hz, $p=0.003$) [15]. This finding, to some extent, complements the study by Kapusta and Domżalski and indicates that ESWT has significant therapeutic effects on

DOI: 10.54254/2753-8818/2026.36262

plantar fasciitis in runners across both short-term and long-term outcomes, as well as significant effects on improving the biomechanical properties of the plantar fascia.

A study on the efficacy of extracorporeal pulse activation therapy (EPAT, a type of rESWT) for lower-limb running-related injuries also supports the therapeutic effectiveness of ESWT in treating plantar fasciitis in runners [16]. This study included 94 runners who received EPAT treatment for various foot and ankle injuries. Among the runners with plantar fasciitis who received EPAT, around 80% achieved functional score improvements surpassing the minimal criterion represented a "clinically noticeable improvement" [16].

These evidences suggest that ESWT promotes collagen remodeling and improves the biomechanical properties of the plantar fascia through mechanical stimulation, while also reducing nociceptive nerve sensitivity, thereby achieving an analgesic effect [14-16]. Progressive dose-escalation ESWT protocols may bypass neural habituation through gradually intensifying stimulation and thereby sustaining the analgesic effect [15]. The above studies conducted in recreational runners have confirmed both short- and long-term efficacy, making ESWT currently the most robustly evident intervention in athletic populations.

3.2. Resistance training and stretching

Resistance training for plantar fasciitis primarily targets the intrinsic foot muscles and calf muscles, while related stretching mainly includes stretching of the triceps surae (gastrocnemius and soleus) and the plantar fascia itself.

A clinical study involving 10 young athletes with plantar fasciitis implemented a 2-month foot and ankle functional rehabilitation program (including strengthening of foot and ankle muscles, restoration of joint range of motion, balance and proprioception training, and flexibility stretching) combined with plantar massage [17]. And the results showed significant pain relief and improvement in foot and ankle function among the athletes. Resistance training targeting foot and ankle function is significantly effective for plantar fasciitis in athletes, but the conclusions are limited by potential biases such as the small sample size [17].

Another small-sample randomized controlled trial included 30 male athletes with chronic plantar fasciitis, randomly allocated to an ESWT group (n=15) and a stretching group (n=15) [18]. The stretching group received a 5-week intervention consisting of plantar fascia, Achilles tendon, and calf muscle stretching performed three times daily. The results showed that both the ESWT and stretching groups showed significant improvements in VAS pain scores, range of motion for ankle joint and strength of plantar flexor after treatment ($P<0.001$) [18]. The results reported from the stretching group indicate that stretching is highly effective for short-term management of chronic plantar fasciitis in athletes. However, this study only included male participants and used a small sample size without assessment of long-term outcomes, which limits the generalizability of its conclusions.

However, two studies have figured out that atrophy of the intrinsic foot muscles occurs in runners with chronic plantar fasciitis, and this anatomical feature has a close association with disease onset. Strength training for the intrinsic foot muscles (including high-load resistance training) has been shown to effectively increase muscle volume and strength, improve arch function, and relieve pain, with greater effectiveness than stretching alone [19, 20]. This indicates that resistance training for foot and ankle function with a combination of stretching, is highly effective in treating plantar fasciitis in runners. By lengthening the fascia and Achilles tendon and improving ankle dorsiflexion, stretching can reduce plantar fascia tension [18-20]. On the other hand, resistance training of the intrinsic foot muscles can increase muscle volume and strength and enhance the dynamic support

DOI: 10.54254/2753-8818/2026.36262

capacity of the arch in an effective way [18-20]. In conclusion, A combined program of resistance training and stretching demonstrates superior overall outcomes compared with stretching alone.

3.3. Dry needling

Define abbreviations and acronyms the first time they are used in the text, even after they have been defined in the abstract. Each time you use an acronym for the first time, spell it out and put the acronym in parentheses after the full name. Do not use abbreviations or acronyms in the title or headings unless they are necessary. Avoid using a given acronym unless you use it five or more times in your paper. Dry needling (it is similar to acupuncture in technique but is based on different theoretical principles) aims to relieve soft tissue pain and tension, or to improve muscular dysfunction through inserting thin and solid needles into "trigger points". "Trigger points," are also deemed as myofascial trigger points, located in muscles, tendons, ligaments, or connective tissue.

A randomized controlled trial divided 50 athletes who suffered from heel pain into an experimental group (conventional treatment + dry needling of the gastrocnemius and soleus muscles) and a control group (with only conventional treatment) with a four weeks duration [21]. The results showed that, in the experimental group, the mean of the VAS score (0–10 points) decreased from 8.04 to 3.80. In the control group, it decreased from 7.72 to 4.88. Both groups experienced obvious pain improvement and the experimental group showing significantly greater improvement. The Foot Function Index (FFI) (0–100 points) decreased by 28.44 points in the control group after treatment, compared with a decrease of 40.56 points in the experimental group. On the Lower Extremity Functional Scale (LEFS) (0–80 points), the pre- to post-treatment difference was 19.84 points in the control group, compared with 24.52 points in the experimental group. These results reveals that dry needling combined with conventional treatment is significantly more effective than conventional treatment alone in reducing pain and improving foot function, as measured by the Foot Function Index (FFI) and the Lower Extremity Functional Scale (LEFS). Nevertheless, it also showed that in terms of improving ankle dorsiflexion range of motion, the two groups achieved comparable outcomes, with dry needling showing no additional benefit [21]. These means dry needling combined with conventional therapy is effective in the short term for treating heel pain in athletes. However, insufficiency exists in other clinical studies on dry needling for heel pain in athletes and more research is required to support the clinical efficacy in athletic population.

In summary, dry needling shows potential for management of short-term symptom: through altering local muscle tension and patterns of neuromuscular activation, it can demonstrate instant analgesic effects when combined with conventional therapy.

4. Other physical therapy for plantar fasciitis in athletic populations

4.1. Instrument-assisted soft tissue mobilization with guidance of musculoskeletal ultrasound imaging

Instrument-assisted soft tissue mobilization guided by musculoskeletal ultrasound imaging requires therapists to use specialized tools to scrape and apply pressure to subcutaneous fascia, muscles, tendons, and ligaments under real-time ultrasound guidance and monitoring. It aims to release adhesions, scar tissue, and fascial restrictions. This technique also uses ultrasound imaging to precisely locate the lesion and to monitor changes in tissue morphology and the depth of instrument penetration during treatment in real time. Precise assessment combined with instrument-assisted soft tissue mobilization under musculoskeletal ultrasound guidance offers individualized implement for

DOI: 10.54254/2753-8818/2026.36262

treatment localization, helping to identify discrepancies between the actual lesion location and conventional assumptions, and hence guiding more precise application of other therapeutic methods [22].

A case report presents a notable finding: the patient was a 46-year-old female yoga practitioner and recreational runner with a 6-month history of right-sided plantar fasciitis, who had not responded well to other prior treatments [22]. Musculoskeletal ultrasound revealed that the site of fascial thickening and tendinopathy-like changes deviated from the conventional calcaneal insertion site. Instrument-assisted soft tissue mobilization was then precisely performed under musculoskeletal ultrasound guidance. Combined with other physical therapy interventions, the patient reported, after four weeks, restoration of normal ankle dorsiflexion, painless palpation of the plantar fascia, a negative windlass test, and pain-free walking, and had resumed running and yoga. At the follow-up lasting for one month, the patient remained free of pain [22]. Although this case report is in relatively low evidence, it offers inspiration and new directions for the treatment strategy of plantar fasciitis in runners.

4.2. Foot orthotic devices

From the perspective of foot biomechanics, orthotic devices (especially for motion-control running shoes) can reduce tensile loading on the plantar fascia by limiting excessive foot pronation [23, 24].

A secondary analysis of a randomized controlled trial involving 372 recreational runners demonstrated that wearing motion-control running shoes reduced the risk of pronation-related injuries by approximately 60% (HR=0.41, 95% CI: 0.17–0.98, p=0.047), while it showed no significant effect on injuries unrelated to the pronation mechanism [23]. Among the pronation-related injuries identified in this study, there were 25 cases in total, including two cases of plantar fasciitis in runners. Although the sample size was small, study results shows that motion-control running shoes can significantly reduce the risk of injuries related to pronation by limiting excessive foot pronation, which suggests potential preventive value for runners exhibiting excessive pronation. This approach may serve as an assistant within a comprehensive management strategy for plantar fasciitis in athletic populations. In addition, another study found that increased medial plantar pressure during the stance phase of running is a potential risk factor for Achilles tendinopathy, plantar fasciopathy, and medial tibial stress syndrome [24]. The proposed mechanism might be that elevated medial pressure can lead to an increase in the mechanical stress placed on the plantar fascia, Achilles tendon, and tibia [24]. This finding indirectly supports the potential application of motion-control running shoes in management of plantar fasciitis among runners.

4.3. Movement re-education

Movement re-education (such as reducing stride length, increasing step frequency, and barefoot running training) reshapes running patterns from the perspective of neuromuscular control and running mechanics and thus reduces repetitive stress injury and degenerative changes in the plantar fascia [25, 26]. Among these, barefoot running training share high similarity with resistance training, contributing to the strengthening of the intrinsic foot muscles [25, 26].

A UK-based study explored the effectiveness of movement re-education for plantar fasciitis: this study synthesized the opinions on the application of running retraining in the management of lower-limb injuries from 16 international experts. The primary re-education recommendation for plantar fasciitis being to "reduce excessive stride length and increase step frequency" [25]. Notably, barefoot running possesses a feature that combines both movement re-education and resistance training in the

DOI: 10.54254/2753-8818/2026.36262

treatment of plantar fasciitis. A 2022 prospective case series enrolled 20 symptomatic recreational runners who underwent a 6-week barefoot running intervention on grass (15 minutes every other day, during which all other treatments were ceased) [26]. The results showed that 19 of the 20 participants exhibited a significant reduction in pain scores by week 6 (mean reduction of 38.8%), with the reduction further increasing to 58.3% by week 12 [26]. The authors of this study speculated that the underlying short-term mechanisms might be a change in the foot-strike mechanics associated with barefoot running and the plantar pressure can be reduced by soft grass surface. While in the long term, continued stimulation may strengthen the intrinsic foot muscles and improve dynamic arch support, hence reducing repetitive tensile loading on the plantar fascia [26].

5. Conclusion

This review analyzed that the distinct characteristics of plantar fasciitis in athletic populations and highlighted the differences in risk factors for plantar fasciitis between athletic and general populations from a mechanistic aspect. Based on this foundation, this review discussed several physical therapy interventions (including ESWT, dry needling, stretching and resistance training, and orthotic devices) for the treatment of plantar fasciitis in athletic populations, and found that ESWT is currently one of the interventions with the strongest evidence base for relieving pain and improving plantar fascia biomechanics in this population. Resistance training combined with stretching, orthotic devices, and movement re-education have biomechanical rationale supporting their applicability to athletic populations. However, research specifically aiming to athletic population remains limited, and large-sample studies in the future are needed to substantiate their effectiveness.

Across the studies included in this review, nearly all research conducted in athletic populations shares similar limitations: sample sizes are generally small, most studies employ single-interventions, short-duration designs with limited long-term follow-up. Meanwhile, study populations largely consist of recreational runners, with limited data available on competitive runners and other elite athletes. Additionally, research on dry needling in athletic populations remains shortage and instrument-assisted soft tissue mobilization with musculoskeletal ultrasound guidance is currently supported only by case reports and both interventions were characterized by a low level of evidence.

Future research should therefore proceed in the following directions: (1) conducting subgroup analyses across different sport types (e.g., running, ball sports, strength sports) to clarify the moderating effect of sport type on treatment response; (2) conducting RCTs of combined interventions to systematically compare the long-term efficacy of different treatment combinations (e.g., ESWT combined with intrinsic muscle training, or movement re-education combined with orthotic devices); (3) establishing return-to-sport criteria and outcome assessment frameworks specific to athletic populations with plantar fasciitis, and incorporates sport performance metrics rather than relying solely on pain and functional scales; (4) conducting robust and well-structured studies in elite competitive athletes to tackle with the current evidence gap in this population. (5) Other physical therapy interventions, such as dry needling and instrument-assisted soft tissue mobilization with guidance of musculoskeletal ultrasound imaging, require further research specifically in athletic populations to establish their therapeutic efficacy.

Overall, the management of plantar fasciitis in athletic populations should not be confined to a single treatment approach. Instead, physical therapy interventions should be flexibly selected and combined based on the stage of the condition, individual biomechanical characteristics, and sport-specific demands, in order to achieve individualized and systematic treatment and improve overall therapeutic efficacy.

References

[1] Tseng, W. C., Chen, Y. C., Lee, T. M., & Chen, W. S. (2023). Plantar fasciitis: An updated review. *Journal of Medical Ultrasound, 31*, 268. https://doi.org/10.4103/JMU.JMU_2_23
[2] Buchanan, B. K., Sina, R. E., & Kushner, D. (2024). Plantar fasciitis. *StatPearls Publishing*. https://www.ncbi.nlm.nih.gov/books/NBK431073/
[3] Rhim, H. C., Kwon, J., Park, J., Borg-Stein, J., & Tenforde, A. S. (2021). A systematic review of systematic reviews on the epidemiology, evaluation, and treatment of plantar fasciitis. *Life, 11*, 1287. https://doi.org/10.3390/life11121287
[4] Grim, C., Kramer, R., Engelhardt, M., John, S. M., Hotfiel, T., & Hoppe, M. W. (2019). Effectiveness of manual therapy, customised foot orthoses and combined therapy in the management of plantar fasciitis—A RCT. *Sports, 7*, 128. https://doi.org/10.3390/sports7060128
[5] Tien, C. H., Chiu, M. C., Shen, Y. L., Ko, Y. C., & Lee, J. J. (2026). Comparative effectiveness of minimally invasive therapies for plantar fasciitis: A systematic review and network meta-analysis. *Scientific Reports, 16*, 9074. https://doi.org/10.1038/s41598-026-40038-z
[6] Koc, T. A., Bise, C. G., Neville, C., Carreira, D., Martin, R. L., & McDonough, C. M. (2023). Heel pain—Plantar fasciitis: Revision 2023. *Journal of Orthopaedic & Sports Physical Therapy, 53*, CPG1–CPG39. https://doi.org/10.2519/jospt.2023.0303
[7] Cortés-Pérez, I., Moreno-Montilla, L., Ibáñez-Vera, A. J., Díaz-Fernández, Á, Obrero-Gaitán, E., & Lomas-Vega, R. (2024). Efficacy of extracorporeal shockwave therapy, compared to corticosteroid injections, on pain, plantar fascia thickness and foot function in patients with plantar fasciitis: A systematic review and meta-analysis. *Clinical Rehabilitation, 38*, 1023–1043. https://doi.org/10.1177/02692155241253779
[8] Riel, H., Cotchett, M., Delahunt, E., Rathleff, M. S., Vicenzino, B., Weir, A., et al. (2017). Is "plantar heel pain" a more appropriate term than "plantar fasciitis"? Time to move on. *British Journal of Sports Medicine, 51*, 1576–1577. https://doi.org/10.1136/bjsports-2017-097519
[9] Merkel, M. F. R., Svensson, R. B., Jakobsen, J. R., Mackey, A. L., Schjerling, P., Herzog, R. B., et al. (2024). Widespread vascularization and correlation of glycosaminoglycan accumulation to tendon pain in human plantar fascia tendinopathy. *American Journal of Sports Medicine, 52*, 1834–1844. https://doi.org/10.1177/03635465241246262
[10] Harvey, H. D., Game, C., Walsh, T. P., Wearing, S. C., & Platt, S. R. (2022). Are models of plantar heel pain suitable for competitive runners? A narrative review. *Journal of Orthopaedics, 33*, 9–14. https://doi.org/10.1016/j.jor.2022.06.011
[11] Wearing, S. C., Smeathers, J. E., Urry, S. R., Hennig, E. M., & Hills, A. P. (2012). The pathomechanics of plantar fasciitis. *Sports Medicine, 36*, 585–611. https://doi.org/10.2165/00007256-200636070-00004
[12] Pazhooman, H., Alamri, M. S., Pomeroy, R. L., & Cobb, S. C. (2023). Foot kinematics in runners with plantar heel pain during running gait. *Gait & Posture, 104*, 15–21. https://doi.org/10.1016/j.gaitpost.2023.05.019
[13] Morrissey, D., Cotchett, M., Said J'bari, A., Prior, T., Griffiths, I. B., Rathleff, M. S., et al. (2021). Management of plantar heel pain: A best practice guide informed by a systematic review, expert clinical reasoning and patient values. *British Journal of Sports Medicine, 55*, 1106–1118. https://doi.org/10.1136/bjsports-2019-101970
[14] Kapusta, J., & Domzalski, M. (2022). Long term effectiveness of ESWT in plantar fasciitis in amateur runners. *Journal of Clinical Medicine, 11*, 6926. https://doi.org/10.3390/jcm11236926
[15] Szajkowski, S., Pasek, J., & Cieslar, G. (2024). Dose escalation can enhance the therapeutic potential of radial extracorporeal shock-wave therapy in the treatment of plantar fasciitis in runners. *Medicina, 60*, 766. https://doi.org/10.3390/medicina60050766
[16] Mitchkash, M., Robinson, D., & Tenforde, A. S. (2020). Efficacy of extracorporeal pulse-activated therapy in the management of lower-extremity running-related injuries: Findings from a large case cohort. *The Journal of Foot and Ankle Surgery, 59*, 795–800. https://doi.org/10.1053/j.jfas.2020.02.008
[17] Gomaa Elkersawy, H. (2016). The impact of rehabilitative exercise program accompanied by massage on foot plantar fasciitis in some athletes. *Journal of Applied Sports Science, 6*, 97–105. https://doi.org/10.21608/jass.2016.84581
[18] Abdoli, A., & Nakhostin Roohi, B. (2019). Effect of extracorporeal shockwave therapy versus stretching in the treatment of athletes with chronic plantar fasciitis. *Physical Treatments, 9*. https://doi.org/10.32598/ptj.9.2.117

[19] Huffer, D., Hing, W., Newton, R., & Clair, M. (2017). Strength training for plantar fasciitis and the intrinsic foot musculature: A systematic review. *Physical Therapy in Sport, 24*, 44–52. https://doi.org/10.1016/j.ptsp.2016.08.008
[20] Cheung, R. T. H., Sze, L. K. Y., Mok, N. W., & Ng, G. Y. F. (2016). Intrinsic foot muscle volume in experienced runners with and without chronic plantar fasciitis. *Journal of Science and Medicine in Sport, 19*, 713–715. https://doi.org/10.1016/j.jsams.2015.11.004
[21] Singh, N. S., Chhonker, K. C., Srivastava, N. S., Jain, K. J., & Shukla, G. S. (2023). Athletes with runner's heel pain: Dry needling's effects and conventional treatment vs conventional treatment: Comparing the effectiveness of dry needling and conventional treatment for runner's heel pain. *Journal of Advances and Scholarly Researches in Allied Education, 20*, 4–22. https://ignited.in/index.php/jasrae/article/view/14256/28316
[22] Sillevis, R., Shamus, E., & Mouttet, B. (2020). The management of plantar fasciitis with a musculoskeletal ultrasound imaging guided approach for instrument assisted soft tissue mobilization in a runner: A case report. *International Journal of Sports Physical Therapy, 15*, 274–286. https://doi.org/10.26603/ijspt20200274
[23] Willems, T. M., Ley, C., Goetghebeur, E., Theisen, D., & Malisoux, L. (2021). Motion-control shoes reduce the risk of pronation-related pathologies in recreational runners: A secondary analysis of a randomized controlled trial. *Journal of Orthopaedic & Sports Physical Therapy, 51*, 135–143. https://doi.org/10.2519/jospt.2021.9710
[24] Brund, R. B. K., Rasmussen, S., Nielsen, R. O., Kersting, U. G., Laessoe, U., & Voigt, M. (2017). Medial shoe-ground pressure and specific running injuries: A 1-year prospective cohort study. *Journal of Science and Medicine in Sport, 20*, 830–834. https://doi.org/10.1016/j.jsams.2017.04.001
[25] Barton, C. J., Bonanno, D. R., Carr, J., Neal, B. S., Malliaras, P., Franklyn-Miller, A., et al. (2016). Running retraining to treat lower limb injuries: A mixed-methods study of current evidence synthesised with expert opinion. *British Journal of Sports Medicine, 50*, 513–526. https://doi.org/10.1136/bjsports-2015-095278
[26] MacGabhann, S., Kearney, D., Perrem, N., & Francis, P. (2022). Barefoot running on grass as a potential treatment for plantar fasciitis: A prospective case series. *International Journal of Environmental Research and Public Health, 19*. https://doi.org/10.3390/ijerph192315466