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Plantar Fasciitis: A Common and Underestimated Condition - A Review of the Current Literature

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ABSTRACT

Introduction and purpose. Plantar fascia is a structure ensuring proper stabilization of the foot. Its malfunction impacts the organism as a whole. Untreated pathology leads to further health consequences. Plantar fasciitis (PF) is one of the most common and neglected foot pathologies. The knowledge on this topic is still insufficient. The purpose of this article is to consolidate current knowledge on plantar fasciitis. It is essential to highlight this problem, because it is a condition that continues to be underrepresented in scientific research.

Material and methods. Medical databases including PubMed, Google Scholar and Embase were searched for scientific articles on risk factors, pathophysiology, symptoms, diagnostic methods, treatment and state of knowledge among society on plantar fasciitis. The identified studies were analyzed and combined into a single article.

State of knowledge. One in ten people develops PF. Its peak incidence ranges from 40 to 60 years old. It occurs in athletic and non-athletic populations. There is no clear consensus among researchers on possible risk factors. Plantar Fasciitis leads to sharp pain at the plantarmedial aspect of the heel. The diagnosis is based on medical history and physical examination. There are numerous methods used in treatment of PF. Not all of them are scientifically proven but they are clinically successful when used. There is still a lack of research on prevention of PF. Awareness of the existence of this medical condition is not sufficient in the general population.

Conclusions. Plantar fasciitis is a common yet underrepresented condition in scientific research, with many studies limited by small sample sizes and short follow-up periods. Increasing awareness of risk factors is essential, as untreated plantar fasciitis may become chronic. Although various treatment options exist, preventive measures remain insufficiently studied despite their importance.

Keywords: Plantar Fasciitis, Plantar Fascia, Plantar Fasciopathy, Chronic Heel Pain

1. INTRODUCTION AND PURPOSE

The plantar fascia is a connective tissue structure that connects the calcaneal tuberosity to the metatarsophalangeal joints, providing stabilization to the arch of the foot. Plantar fasciitis is the number one cause of heel pain in adults [1][2]. It affects people of all ages and with varying levels of physical activity. The pain associated with the condition negatively impacts daily activities and results in a reduced quality of life [3]. This condition is not limited exclusively to foot discomfort. Untreated plantar fasciitis leads to constant musculoskeletal discomfort, misaligned foot, instability and soreness of the ankle joint. Excessive tension is transmitted via the knee causing diminishing of the joint space. These abnormalities contribute to misalignment of the pelvis and spine and, as a result, altering posture and gait [4]. Potentially,

long-term immobility can lead to weight-gain, hypertension, coronary heart disease and type II diabetes. The increasing incidence of foot pathologies indicates the need to consider these conditions as a public health issue [5][6]. Despite the commonness and serious consequences of plantar fasciitis, the awareness of this disease is still poor in society. Considering the complexity of processes leading to developing plantar fasciitis, in scientific articles the terms “plantar fasciitis”, “plantar fasciopathy”, “plantar fasciosis” and “heal pain” are used interchangeably. Despite the fact that the term “fasciitis” implements inflammation, which is frequently not involved in pathophysiology as it was once believed, it is still widespread among scientific articles and literature [7][8]. The authors of this article decided to follow this expression in their work. Among numerous known risk factors of developing PF the following stand out: obesity, pes planus, pes cavus, shortened Achilles tendon, over-pronation of foot, limited dorsal ankle flexion, weak intrinsic and plantar flexor muscles, poor alignment, walking on hard surfaces and bare-foot walking, weight bearing and wearing poorly fitting shoes. Symptom suggesting plantar fasciitis is pain localised in the plantar surface of the foot in the area of the calcaneus. Pain is chronic and appears during first steps after the rest [9]. The diagnosis is based on medical history and physical examination. In some cases imaging is used. There are different treatment methods, including conservative ones like stretching, foot orthoses, taping, extracorporeal shock wave therapy and invasive treatment including dry needling, injections of glucocorticosteroids or toxin botulinum and surgical interventions [2][10].

The aim of this article is to synthesize current knowledge on plantar fasciitis, including its epidemiology, pathophysiology, clinical presentation, risk factors, diagnostic approaches, treatment methods, and public awareness of this condition. Emphasizing plantar fasciitis is essential, as it still remains underrepresented in the scientific literature.

2. STATE OF KNOWLEDGE

2.1 Epidemiology

Feet are frequently the most neglected body part. Meanwhile, their proper functioning is essential in ambulation and maintaining correct body posture. Foot pathologies are common, its prevalence range between 61% and 79%. This state of affairs reduces the quality of life. One of these pathologies is plantar fasciitis (PF). About 10% of the general population suffers from PF. One in ten people develop PF during their lifetime. The peak incidence is within the age

range from 40 to 60 years old. This condition affects women more often than men. It may occur in athletic and non-athletic populations. Among athletes, the condition is more frequent in runners, affecting 17.4 % of them. It contributes to 15% of foot injuries without gender difference. Symptoms last more than a year. One in three people have bilateral plantar fasciitis [11][12]. What is more, the individuals diagnosed with PF are more likely to suffer from other diseases like diabetes, depression and sleep disorders. It can significantly impact not only the quality of life, but also productivity and efficiency at work, resulting in decreased work capacity of employees worldwide [13][14]. Globally, 10% of Americans experiencing heel pain have PF. Around 40% of employees who spend more than six hours a day standing experience this issue. Many jobs obligate workers to stand for long periods, contributing to the development of plantar fasciitis. It also affects roughly 70% of individuals who are overweight or obese. Meanwhile, excessive body mass affects two billion adults and 340 million children all over the world and these numbers are expected to double in the next decade. The increasing global prevalence of sedentary lifestyle, coupled with weight gain and aging, may contribute to a higher incidence of plantar fasciitis, given that obesity and age between 40 and 60 years are known risk factors. About 30% of people over the age of 50 report having plantar fasciitis. Studies deduce that the annual cost of orthopedic appointments due to PF in the US totals 192 - 376 million dollars [14][15].

2.2 Pathophysiology

Plantar fasciitis may develop on the basis of neurological, arthritic, traumatic or neoplastic conditions but the most common etiology is biomechanical dysfunction. Biomechanical dysfunctions position the foot in a way that irritates and overloads the plantar fascia, resulting in pain and discomfort for the patient. PF is often associated with acute inflammatory disease. However, the histologic findings showed that the process taking place in plantar fascia can happen without inflammation. It occurs to be a chronic degenerative illness. Repetitive stress factors, such as standing or weight bearing lead to repetitive microtears in the plantar fascia which exceed the body’s repair capacity. The number of fibroblasts increases. Dysfunctional vasculature reduces the delivery of nutrients to the impaired fascia, inhibiting cellular synthesis of the extracellular matrix required for tissue repair and remodeling. The ground substance (matrix of the connective tissue) is fragmented [16]. Acid mucopolysaccharides accumulate, causing myxoid degeneration and neovascularization appears. During the constant stretching of the fascia, the damages result in chronic degeneration, causing pain even at rest. This is the reason why some authors of publications use the

term ,,plantar fasciosis” (which means ,,degeneration”), ,,plantar fasciopathy" or ,,plantar heel pain” instead of ,,plantar fasciitis’’. Recurrent microtrauma of the medial calcaneal tuberosity leads to secondary inflammation causing bony degeneration and periostitis of the medial calcaneal tubercle. The calcification process can generate subsequent problems with formation of calcaneal spur - a bony outgrowth localised on calcaneal tuberosity. Running and dancing activities predispose to development of plantar fasciitis due to maximum plantar flexion of the ankle and dorsiflexion of the metatarsophalangeal joint [2][7][17].

2.3 Risk factors

There are a lot of risk factors which can lead to the development of plantar fasciitis but there is no clear consensus among researchers on this topic.

The risk factors can be divided into intrinsic and extrinsic. Intrinsic factors subdivide into anatomic and biomechanical. Anatomic factors include: obesity, pes planus, pes cavus and shortened Achilles tendon. Biomechanical factors involve over-pronation, limited dorsal ankle flexion, weak intrinsic muscles and weak plantar flexor muscles. Extrinsic factors are poor alignment, hard surface, walking bare-foot, weight bearing, low quality footwear. Plantar fasciitis can develop in either physically active and inactive people [5][18].

Risk factors of developing plantar fasciitis in athletic populations are increased plantarflexion range of motion (ROM), BMI and body mass. These factors seem to increase the tensile load on the force-absorbing structures of the foot’s plantar surface. BMI is not a reliable indication of body fat in an active population but it can also increase due to lean body mass. What is more, increased BMI can also be a risk factor of medial stress syndrome in the athlete population. Due to these reports, individuals with increased BMI and body mass should slowly adapt their tissues to loading through slow and progressive increases in exercise. Tight triceps surae causes the increase of the degree of plantarflexion during the running gait cycle as a consequence of the positive correlation between plantar fascia and Achilles tendon load. Achilles tendon may be involved with plantar fasciitis due to the positive relationship between plantar fascia thickness and Achilles tendon parthenon thickness [19]. Pes planus is a condition in which arches of feet are flat and low. It results in lack of arch cushioning and increased loads on plantar fascia. Pes cavus is characterized by the presence of a high arch of the foot. It leads to limited foot function, joint instability and muscle imbalance [20].

Jha, Daman Kumar and others examined the association between ultrasonographic images of plantar fascia, BMI and age. They confirmed the thickness of plantar fascia increases with age and BMI. Participants without symptoms of plantar heel pain had the thickness

of plantar fascia less than 3 mm. The stiffness and thickness change the biomechanical properties of plantar soft tissue and can be the reason for foot problems [21].

Plesek J., Hamill J.and others conducted a cohort study in which 1206 people participated, including 563 females and 643 males in the age of 18-65 years old. 715 of them were runners and 491 were not. The authors of the study wanted to reveal potential associations between running distance, biomechanical risk factors and plantar fasciitis while controlling for running distance, sex and age. In the whole sample age occurred to be an important predictor for plantar fasciitis. Each year the possibility of developing this condition increased by 3.9%. Younger individuals were less predisposed to it than older ones controlling for sex and running distance. What is more, the study showed that runners who run over 40 km per week were six times more likely to experience plantar fasciitis than non-runners. There were no differences between non-runners and runners whose distance was less than 41 km per week. Women were more likely to develop PF than men. The authors also found a relevantly lower maximal ankle adduction (internal rotation) in runners who did not suffer PF compared with injured group (i.e., non-injured runners had higher abduction angle). The study suggests that optimal weekly dose of running (<41 km) and suitable biomechanics (more toeing out of the foot relative to the shank) may minimize the risk of developing PF and related injuries in runners [22].

Khired Z, Najmi M H and others conducted a study on inhabitants of Jazan area in Saudi Arabia. The authors examined the prevalence and risk factors of plantar fasciitis in the mentioned population. Authors of the study found out that long time of work spent on walking or standing position were correlated with the higher risk of developing plantar fasciitis. Moreover, tightness of the gastrocnemius muscle is also associated with this condition [23].

Umar H., Idrees W. et al. run a study examining the impact of routine footwear on foot health. The height of the heels, the thickness of the insoles and the type of the insoles were compared. The study showed that 83,2% of participants did not use well-adjusted footwear (with thickness of the heel between 0,5 and 4 cm, thick soles and insoles ensuring the support of foot arch). It was demonstrated that people using the footwear with thickness of the heel < 0,5 cm, thin soles and/or thin, non-amortizing insoles experienced more pain than people wearing well-adjusted shoes [24].

2.4 Symptoms and diagnosis

The diagnosis of plantar fasciitis is made based on medical history, physical examination and imaging tests if need be. Patients suffer from sharp pain at the plantarmedial aspect of the heel. The greatest intensity of pain occurs during the first morning steps or after a long rest

and diminishes throughout the day, but its severity can increase at the end of the day. It can extend into the medial arch of the foot. The pain decreases after walking for a while and increases at the end of the day and after impact activities. Tenderness locates at the plantar aspect of the medial calcaneal tuberosity around the fascia insertion in the os calcis. The patients usually do not look for professional help until their symptoms are already chronic [9]. The pain can lead to substantial disability and cause limitations in exercising, work-related activities and daily living aspects. The prognosis is not clear but in the majority of people the symptoms resolve over time. Part of the patients experience inconveniences even for years [25][26]. Usually the symptoms are unilateral but circa 30% of patients present bilateral ones.

The Windlass test can be a useful tool in making diagnosis. During this test, the examiner makes dorsiflexion of the great toe of the painful foot, while the patient is standing. The test is positive when this manipulation provokes pain. The Windlass test has 100% specificity but only 32% sensitivity. Imaging tests can also provide valuable information. X-ray is a helpful method in ruling out bony causes of pain, e.g. calcaneal spur [2]. Soft tissue imaging is not used in the diagnosis of PF on a regular basis. However it can be helpful especially in patients suffering from heel pain refractory to months of conservative therapy. This type of imaging allows to set a diagnosis and exclude differential diagnosis like plantar fascia fibromatosis or heel pad contusions. Ultrasonography is a reliable, cheap and noninvasive method. According to normative values, the thickness of plantar fascia in healthy adults is 3.9 ± 0.5 mm. The greater values are considered abnormal. Apart from increased thickness, another specific occurrence are hypoechogenic areas [27].

Another method used in diagnosis of PF is MRI. Characteristic findings are increased signal intensity and proximal thickening of plantar fascia on T2 weighted and short tau inversion recovery images. Nevertheless, MRI is the most useful in excluding other causes of heel pain, for example baxter neuritis (demonstrating atrophy of the abductor digiti quinti minimi muscle belly) and calcaneus stress fracture (with linear low T1 and high T2 signal in the posterior tuberosity of the calcaneus). Electromyography (EMG) is used in patients with sensory disturbances or radiation. Chronic neurologic pain is secondary to entrapment of the local nerve (medial calcaneal nerve branches or first branch of the lateral plantar nerve). This method allows to localize the site of entrapment [28].

2.5 Treatment

There are surgical and non-surgical methods used in treatment of plantar fasciitis. Not all of the methods are scientifically proven, but they are clinically successful when used. About 80%

of patients improve within 12 months after nonoperative therapies. Amongst these therapies the following conservative ones stand out - stretching, foot orthoses, taping, extracorporeal shock wave therapy. Invasive treatment includes dry needling, injections of glucocorticosteroids or toxin botulinum, surgical interventions [10][29].

Conservative therapies

Conservative treatments are usually recommended before using any invasive treatment.

The **insoles** are the easiest to change tool reducing the symptoms of musculoskeletal disorders of the lower limbs. There is no consensus on the perfect type of the insole for patients suffering from plantar fasciitis. However, there is an agreement on the need for medial longitudinal arch support. The well-adjusted shoes should have the thickness of the heel between 0,5 and 4 cm and thick soles [24][30][31].

Apart from well-adjusted insoles and shoes, **orthotics** seem to be a promising treatment for patients suffering from PF. Foot orthoses reduce stress exerted on tissues during standing and walking and raise the foot's medial longitudinal arch. Moreover, orthoses change the tonus of different groups of muscles due to proprioceptive stimulation of the plantar sensors. These properties result in the reduction of pain and disability [32][33].

Gupta R., Malhotra A. et al. conducted a study comparing different treatments modalities for plantar fasciitis used alone. The participants, all experiencing PF, were separated into 4 groups. Group 1 was prescribed **painkillers** (indomethacin or diclofenac). Group 2 used **moist heat** to the sore foot for 20 min at night and **silicone heel rubber pad** in shoes. Group 3 performed plantar fascia **stretching** exercises. Group 4 did calf stretching exercises. The study showed the improvement in groups using moist heat with heel pads and both stretching groups more than in the group taking painkillers. Moreover, the group stretching the plantar fascia had the best results in comparison to all others [34].

Stretching is a conservative and easy to implement method used in treatment of PF. Patients can practice everywhere at any time. Stretching of the Achilles tendon in combination with plantar fascia stretching gives a better effect on the reduction of pain and improvement of dorsiflexion range of movement at the ankle joint in comparison to exclusive stretching of the Achilles tendon. It is recommended to perform both passive stretching, such as pulling the toes back using the hand or a towel, and active stretching exercises, such as heel raises.

Another method used in treatment of PF is **Self-Myofascial Release (SMR**). SMR becomes increasingly popular in the general and athletic population. Foam rollers, massage balls and bars help to increase flexibility and reduce the pain. Moreover, this method reduces arterial

stiffness, improves arterial function and enhances functioning of vascular endothelium. The combination of stretching and using foam roller is more effective in pain reduction and increasing ROM than exclusive stretching [35][36].

Taping is a form of conservative treatment easy to apply and bringing quick relief. Dong-Hoo Kim and Yongwoo Lee in their study checked the influence of dynamic taping and kinesiology taping on foot's pain, pressure, function and balance in patients with PF. Dynamic taping is focused on mechanical effects, helping in muscles' work, while kinesiology taping causes improvement of blood circulation and stimulation of proprioception. The study showed that dynamic taping and kinesiology taping connected with physical therapy can be successfully used in relieving the foot pain and foot pressure [37].

Extracorporeal shock wave therapy (ESWT) is the type of treatment, in which the transmission of a shock or pressure wave leads to regenerative effects on the tissue. The physical energy is transformed into a biological one. Cell skeletal annexes are activated and cause the release of mRNA from the nuclei. It leads to activation of mitochondria, endoplasmic reticulum and cell vesicles, allowing the release of proteins taking part in the healing process [38]. ESWT stimulates angiogenesis and increases blood flow throughout the damaged tissue. Lippi L., Folli A. et al. in their systematic review showed that both focused ESWT (f-EWST) and radial (r-ESWT) result in diminution of pain intensity in patients with PF. In addition, the study suggests that higher energy intensities are related to greater reduction of pain. Lower intensities are gentler and more appropriate in sensitive areas and more superficial conditions. ESWT is considered a safe, well-tolerated and effective method in treatment of PF [39][40].

Conservative treatment is sufficient in most cases, resulting in symptom relief. However, there are individuals recalcitrant to this type of treatment. In this situation the invasive methods are considered.

Invasive treatment

Dunning J., Butts R. and others run a study investigating the impact of using **dry needling** as an adjunct to exercise, manual therapy and ultrasound for PF. All participants were randomized to receive mentioned methods of treatment including dry needling or without it. The needles were put in 8 positions and left there for 20 minutes with electric stimulation (frequency 2Hz, pulse duration 250 microseconds). The authors showed that combination of exercise, manual therapy, ultrasound and dry needling was significantly more successful in reducing first-step morning pain, pain during activity and rest, improving quality of life

and medication intake in comparison to combination of these methods without dry needling [41].

Injections of **corticosteroids** have been used in plantar fasciitis treatment since the 1950s. This method is cheap, uncomplicated and it brings quick pain relief. Foot injections are associated with considerable pain, therefore local or regional anaesthesia like tibial nerve block should be used. There are no premises suggesting the superiority of one kind of corticosteroid over another. Injections can be performed using palpation or ultrasonography. Both methods are effective. The effects of corticosteroids are usually short term, lasting 4 to 12 weeks. The risk of serious adverse effects are low. Amongst minor complications there was reported post-injection heel pain. Multiple corticosteroid injections and obesity are considered potential risk factors for major complications like plantar fascia rupture or heel pad atrophy [42].

Due to concerns regarding the long-term benefits of using corticosteroid injections, attention has been directed at other methods that may offer longer term benefits. **Platelet rich plasma** (PRP), just as corticosteroids, has anti-inflammatory properties. PRP has a positive impact on treating degenerative conditions but there is no consensus on its use on plantar fasciitis. Plantar fasciitis is a condition of degenerative origin, therefore PRP may be advantageous over corticosteroids due to abundance of growth factors and bioactive cytokines, which are believed to improve healing by augmenting cellular migration, cellular proliferation, promoting angiogenesis and increasing matrix deposition. Corticosteroids do not have regenerative properties. Their action is based on anti-inflammatory effects without treating the underlying cause, therefore reduction of heel pain is short-lived [43].

PRP injections involve withdrawing approximately 50 ml of blood and require specialized platelet-concentrating equipment and advanced techniques in a clinical setting. Another solution is using whole blood preparations. **Autologous whole blood injections (AWB)** contain potent growth factors within the platelets able to promote healing in chronic soft-tissue injuries. AWB injections lead to increased growth-factor expression, enhanced angiogenesis and greater cellular proliferation [44][45].

Nowadays, **dextrose prolotherapy (DPT)** is frequently used in musculoskeletal diseases. However, there are few studies analyzing its impact on treating PF. This method involves injections of hypertonic dextrose solution. Prolotherapy and radial ESWT have comparable efficacy in decreasing the level of pain, improvement of daily-life quality and thickness of plantar fascia [46]. DTP is more effective in reducing pain in short-term and medium-term related to placebo and exercise. Prolotherapy also leads to better functional outcomes in the

short-term. There also seems to be no significant difference between DTP and injections of platelet-rich plasma regarding the level of pain and functional outcomes. Corticosteroid injections are more effective in reducing pain in the short-term but there is no significant difference between this method and DTP in the medium-term [47].

BoNT-A, a subtype of **botulinum toxin**, is known for its low serum toxicity and prolonged analgesic effect. It has the potential to relieve fascial and muscular-derived pain. Its positive effect on fasciitis can be explained by some mechanisms like inhibition of presynaptic acetylcholine release (reducing muscle tension and pain), suppression of nociceptive neurotransmitters release (glutamate, substance P, calcitonin gene-related peptide; reducing pain) and participating in the regulation of inflammatory substances, such as IL-18, IL-10, IL-1β produced in nerve damage (reducing inflammation and pain). In systematic review and meta-analysis conducted by Li TT, Liu ZY and al., the injections of BoNT-A had a significant therapeutic effect and relieved pain in patients with plantar fasciitis. The abundance of different mechanisms suggest it can be a powerful treatment but more research is needed to discover long-term benefits and potential risks [48].

Patients with more intense symptoms and suffering for longer periods of time are less likely to respond to treatment. There is a greater risk of transitioning to chronic state as a consequence of processing the peripheral pain and psychological reactions to pain. Therefore, it is important to decrease the severity of plantar heel pain in early states [49].

Surgical intervention should be considered in recalcitrant cases. Radiofrequency microtenotomy is an effective less invasive method used in treating plantar fasciitis. The performance of the procedure may vary between different surgeons. Generally, the probe for radiofrequency microtenotomy is inserted and applied to the plantar fascia in a regular, grid-shaped pattern [50]. Fasciotomy can be conducted using traditional or endoscopic methods. During open plantar fasciotomy a small incision is made along the medial side of the calcaneus. The fat and muscle are separated from the plantar fascia. Subsequently, the aponeurosis is cut partly or throughout its breadth [51]. Endoscopic fasciotomy involves incising the plantar fascia with an endoscopic approach, along with removing inflamed or fibrotic tissue and any potential bone spurs. Gastrocnemius contracture leading to limited ankle dorsiflexion can be the main cause of chronic form of plantar fasciitis. Proximal medial gastrocnemius release is applied to reduce strain in the Achilles–calcaneal–plantar complex in situations of biomechanical overload [52][53][54].

An important and underestimated element of treating plantar fasciitis can be the patient's education. Although this was never tested as a sole treatment method, it is recommended by

experts and welcomed by patients. Education is suggested as essential for effective treatment and preventing recurrence. The aetiology of plantar fasciitis should be understood as in all musculoskeletal disorders. It increases the patient's engagement and success of the treatment [55].

2.6 Prevention

There is still a lack of research on prevention of plantar fasciitis. The implementation of certain preventive measures may reduce the incidence of this condition. Increased BMI levels are considered one of the main causes of plantar fasciitis. Reducing excess body weight leads to a number of positive health changes, including decreasing loads put on plantar fascia and its thickening [21][56]. Avoidance of activities demanding loading of the aponeurosis such as long-standing and excessive weight-bearing are considered protective factors. An important aspect of treating and preventing plantar fasciitis is choosing footwear carefully. The footwear should be purchased in the afternoon or in the evening as feet expand throughout the day. Shoes tried on in the morning can become too tight later in the day. The insoles should provide the support of medial longitudinal arch. The well-adjusted shoes should have the thickness of the heel between 0,5 and 4 cm and thick soles. One of the protective factors can be stretching Achilles tendon, calf muscles and plantar fascia. There are reports that tightness of hamstring muscles may contribute in developing plantar fasciitis, therefore they should be stretched as well [56].

2.7 Awareness among society

Awareness of the existence of a medical condition such as plantar fasciitis is still not sufficient in the general population. Plantar fasciitis is one of the main causes of heel pain and leads to serious health consequences. All these factors result in a reduction in the quality of life. Faisal Tariq Alayed et al. conducted a study over awareness and knowledge about PF. They showed that there were no significant differences in awareness of PF and sex, age, location and nationality of the participants. The majority of participants never heard of PF. The rest drew knowledge from unreliable social media channels. The authors of the study indicated the need to increase people’s acknowledgment about this condition. To strengthen evidence-based practices and improve the well-being of those affected, it is essential to conduct further research in this area [57]. Obesity is a significant public health concern, with prevalence steadily increasing among individuals of all ages. The World Health Organisation declared obesity as an epidemic of the 21st century. Its consequences concern not only widely known

cardiovascular diseases and development of diabetes and hypertension but also occurrence of plantar fasciitis. Karthik Ganesh Mohanraj et al. run a study examining the knowledge on the association between higher BMI and plantar fasciitis. Despite the increasing relevance of obesity in the general population, the majority of participants was not aware that higher BMI levels can result in development of plantar fasciitis [58]. Khabia V. and Haral P. examined the individuals' awareness on health problems caused by poorly-fitted footwear. The majority of people were not aware of such correlation. Some participants were unaware of their footwear size and a lot of them admitted to wearing ballet flats and flip-flops rather than shoes, which is as harmful as wearing high heels. In contemporary society, high heels remain one of the most popular footwear choices [31].

3. CONCLUSIONS

Plantar fasciitis is a common problem that is underrepresented in scientific research. Research groups are often small and studies are not conducted long-term, making it difficult to properly interpret results and translate them into global trends. Meanwhile, foot health is essential for maintaining proper posture and gait, as well as maintaining a satisfactory quality of life [4][6][57]. Increasing public awareness of the risk factors for PF, especially modifiable ones such as excess body weight, weakened lower limb muscles, ill-fitting footwear, excessive foot loading and abnormal gait, is crucial. Pain that appears with the first steps after getting up in the morning or after a long rest, localized in the plantar surface of the foot near the heel bone, should not be ignored. Left untreated, the condition can become chronic. There are many treatment options for people suffering from plantar fasciitis, including conservative and invasive methods. However, as with any condition, prevention is better than cure whenever possible. There is still a lack of research on prevention of plantar fasciitis. However, several adjustments can be implemented to decrease the risk of developing PF, such as weight loss, choosing well-fitted footwear and avoiding excessive load on plantar fascia [11][13][16][31][49][57].

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