



UNDERSTANDING PLANTAR FASCIITIS THROUGH THE LENS OF AYURVEDA: BEYOND INFLAMMATION

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Abstract: Plantar aponeurosis, an expansive connective tissue which is thickened Central part of deep fascia of sole that aids in stability of body and weight bearing during standing, walking and running, besides many other functions. Though the suffix 'itis' denotes inflammation, it serves as misnomer as current research indicates that local inflammation is not the primary cause of this condition. Plantar fasciitis is now recognized as a degenerative rather than inflammatory process, prompting many experts to prefer the term plantar fasciopathy or plantar heel pain. Although inflammation often implies the need for rest, anti-inflammatory treatments are generally ineffective and not recommended for this disorder. Hence this article is an attempt to understand Plantar fasciitis with the help of *Ayurveda* and substantiate that it is not merely an inflammatory condition rather reevaluate it as degenerative condition by correlating it to *Snayu gata Vata (dhatu kshayaja)*.

Index Terms - Plantar Fascia, Fasciitis, Inflammation, Degeneration, *Snayu gata Vata*.

INTRODUCTION

Pain is a prominent symptom that interferes with everyday functioning and reduces overall quality of life. Heel pain is a localized form of discomfort that can significantly impair walking and in turn, disrupt daily activities. Among various causes of heel pain in adults, plantar fasciitis stands out as the most common. Epidemiological estimates suggest that nearly one in ten individuals will experience this condition at some point in their lives. Patients often complain of pain in the bottom of foot and few, particularly at heel region while walking, prolonged standing and taking that first step out of bed in the morning. It is also called as painful heel syndrome/policemen's heel/joggers' heel/tennis heal.

The plantar fascia is a band of connective tissue that runs along the underside of the foot from the calcaneus to the proximal phalanges. The fascia helps maintain the integrity of the arch of foot, provides shock absorption, plays an important role in the normal mechanical function of the foot, bears and distributes the weight of body.

What is inflammation? (itis)

Inflammation is an ancient medical term referring to classic signs and symptoms, including oedema, erythema (redness), warmth, pain, and loss of function (stiffness and immobility)¹. Inflammation is a second line defense against infectious agents. Both cell mediated and humoral responses of the immune system are central to inflammation².

On investigation individuals with CRP levels of greater than 3.0 mg/dl are tend to be physically inactive³. Acute inflammation has a rapid onset of minutes or hours, typically resolves within a few days, has classic signs and symptoms, and has a cellular infiltrate primarily consisting of neutrophils⁴.

Chronic inflammation can arise from persistent infections caused by microorganisms that are difficult to eliminate, such as mycobacteria, viruses, fungi, and parasites, triggering delayed type hypersensitivity reactions that may lead to granulomatous responses or unresolved acute inflammation evolving into a chronic state⁵.

Differentiating inflammation, infection and tissue degeneration is clinically relevant due to many pathologies that distinguish evaluation and treatment.

Plantar fasciitis is a degenerative condition that causes heel pain and is often caused by repetitive strain on the plantar fascia, occurs probably due to overuse with the development of degeneration and microtears. It is often mistakenly labelled as a heel spur by the general population. The role of inflammation is unsupported and here we discuss further reinterpreting the condition through the degenerative lens and correlate with *Snayu gata Vata* caused by *dhatu kshaya* as explained by eminent *Acharyas* in the classical texts of *Ayurveda*.

DISCUSSION

Plantar fasciitis can be challenging, as there is no single definitive cure. However, majority of patients achieve satisfactory relief with conservative, non-surgical approaches.

Causative factors:

The exact cause of plantar fasciitis is often uncertain and is likely influenced by multiple factors. Given its high prevalence among runners, it is commonly attributed to repetitive microtrauma. Contributing risk factors include obesity and occupations that involve prolonged standing or weight-bearing⁶. Although it is sometimes associated with heel spurs (bony outgrowths), this relationship is inconsistent. Many individuals with heel spurs remain symptom free, while a significant number of patients with plantar fasciitis show no such bony changes.

Overall, the risk factors can be broadly categorized into extrinsic factors, such as training errors and improper footwear, and intrinsic factors, including structural abnormalities, functional imbalances, and degenerative changes.

Extrinsic factors:

Training related mistakes are a leading contributor to plantar fasciitis. Many affected individuals, particularly athletes, report a recent increase in the distance, intensity, or duration of their activity. High impact additions such as sprint training, plyometric exercises, and hill workouts further elevate the risk. Similarly, running on hard or poorly cushioned indoor surfaces can predispose individuals to this condition.

Proper footwear also plays a crucial role in prevention. Individuals who spend long hours on their feet, including athletes, should choose shoes suited to their foot type and activity⁷. Over time, athletic shoes lose their shock absorbing capacity⁸, reducing their protective function. Those who rely on worn out shoes or repeatedly repair shoe soles without timely replacement are at greater risk. Additionally, training in lightweight, minimally cushioned footwear instead of more supportive options can increase the likelihood of developing plantar fasciitis.

Intrinsic factors:

Structural factors play an important role in the development of plantar fasciitis. These include foot arch abnormalities such as pes planus (flat feet) and pes cavus (high-arched feet), overpronation, leg-length discrepancy, increased lateral tibial torsion, excessive femoral anteversion, and a higher body mass index (BMI) ^(7, 9,10,11,12). In individuals with either low or high arches, abnormal stress is transmitted to the plantar fascia during foot strike⁸. While pronation is a normal and necessary movement that allows shock absorption and adaptability of the foot, excessive pronation can increase strain on the plantar fascia. Similarly, biomechanical alterations caused by leg length differences or rotational deformities of the tibia and femur may further elevate stress on the fascia during gait.

Functional risk factors are largely related to muscle flexibility and strength. Tightness of the hamstrings, gastrocnemius, soleus complex, and Achilles tendon is commonly associated with plantar fasciitis¹³, with reduced ankle dorsiflexion being a particularly significant contributor⁶. In addition, weakness of the calf muscles and the intrinsic muscles of the foot can impair proper load distribution, thereby increasing strain on the plantar fascia.

Degenerative changes also contribute to the condition, particularly with advancing age. Heel fat pad atrophy reduces the natural cushioning of the heel, making it more susceptible to stress and injury. Furthermore, epidemiological data indicate a higher prevalence of plantar fasciitis among individuals with increased BMI, with significantly greater occurrence observed in those with a BMI of 30 or above compared to individuals with a BMI below 25¹⁴.

Pathophysiology:

Plantar fasciitis is a condition arising from repetitive microtrauma to the plantar fascia. Continuous mechanical stress during weight-bearing activities leads to the formation of microscopic tears, particularly at the junction where the fascia attaches to the calcaneus ^(15,16,17). Over time, excessive stretching of the plantar fascia either along its length or at its insertion on the medial calcaneal tuberosity results in cumulative structural damage. The dense tissue of plantar fascia requires very large forces far outside the human physiologic range to produce even 1% compression and 1% shear.

When such micro-injuries recur without adequate healing, they give rise to a chronic degenerative process within the fascial tissue. The compromised and partially healed fibers, when subjected to further loading, become a source of significant pain. This is especially evident during the first steps taken after periods of rest, such as early in the morning.

Despite its name, plantar fasciitis is increasingly recognized as a misnomer. Rather than being primarily inflammatory, the condition is now understood to be largely degenerative in nature. Histopathological studies of fascia obtained during surgical procedures have demonstrated features such as fibroblastic proliferation, rather than classical signs of inflammation.

This has led to the introduction of the term “fasciosis/fasciopathy” which more accurately reflects the underlying pathology. Similar to tendinosis, fasciosis represents a chronic degenerative state characterized by fibroblastic hypertrophy, disorganized collagen architecture, minimal or absent inflammatory cells, and irregular vascular patterns with areas of both hypervascularity and relative avascularity ^(18,19,20).

These findings point toward a dysfunctional healing environment. Impaired vascularity limits adequate nutrient supply to the fascia, thereby hindering cellular activity and extracellular matrix synthesis. As a result, the tissue’s ability to repair and remodel itself is significantly compromised, perpetuating the cycle of degeneration and pain.

The important point to understand here in plantar fasciitis is to discuss who are prone to plantar heel pain. The condition generally presents along continuum. On one end there is the younger, more active population such as athletes, on the other side the older, more sedentary individuals with higher body mass index.

Studies, however, reveal that changes in the tissue associated with the injury are degenerative and not related to inflammation, at least not in the way most people typically think of inflammation. Sudden onset of heel pain is due to acute inflammation. Persistent heel pain is because of long standing degeneration of the plantar fascia near its attachment. Anti-inflammatory medications and injections have been unsuccessful at treating it.

A simplified understanding of plantar fasciitis is that it develops when the intensity, frequency, or volume of plantar fascia loading such as during prolonged standing, walking, or running exceeds the tissue's capacity to recover and adapt. In active individuals, this usually results from a sudden increase in physical load, for example, a rapid rise in running mileage or intensity while training for an event, which creates an abrupt "spike" in stress on the fascia. In contrast, among less active individuals, the condition may arise from a gradual reduction in physical activity, flexibility, and overall musculoskeletal resilience, leading to diminished capacity of the plantar fascia to tolerate even routine loads. Thus, the therapeutic goal in both groups is to restore balance between the mechanical load applied to the fascia and its adaptive capacity ensuring that the tissue strength and endurance meet or exceed daily functional demands.

Recent understanding suggests that local inflammation is not the primary cause of plantar fasciitis. Hence, conventional treatments such as anti-inflammatory medications, heel pads, or prolonged rest are generally not recommended. Instead, the focus should be on managing the mechanical load on the plantar fascia by reducing excessive stress, enhancing tissue tolerance, and optimizing foot biomechanics. Simple self-care measures, like rolling the foot over a frozen water bottle or a lacrosse ball, may provide temporary comfort, but they are not essential for long-term recovery.

The key to effective management lies in identifying and modifying aggravating activities, monitoring daily load, and gradually restoring functional capacity through tolerable, progressive physical activity over time.

Understanding Plantar fasciitis through the lens of ayurveda correlating it to *Snayu vikara w.s.r to Snayu gata vata*.

Concept of Snayu:

Snayu in *Ayurveda* is mentioned in the context of *Marma*, *Agnikarma*, *Shashtra karma*, *Bandhana*, *Seevana Karma*, *Sira vyadha* and *Vata vikara*.

Vyutpatti:

Snayu - *Strilinga Shabda (Vachaspati)*

The word स्नायु (*Snayu*) is formed from the root word (*Dhatu*): 'स्ना (*Sna*)'.

स्ना (*snā*) *Dhatu* when combined with उण् (*un*) and युक् (*yuk*) *Pratyaya* forms the word *Snayu*.

मेदसः स्नेहमादाय सिरास्नायुत्वमाप्नुयात् ।

सिराणां तु मृदुः पाकः स्नायूनां च ततः खरः ॥

Sira formed by *Sneha bhaga* of *Medas* after which they get ripped and converted into the *Snayu*. The difference between *Sira* and *Snayu* is that the *Paaka* of the *Sira* is *Mrudu* and that of *Snayu* is *Khara*²¹.

Snayu is derived from *Pitruja bhava*, hence it is *Sthira* and *katina*²².

Definition:

स्नायुः शणाकारः धनुरारोपणयोग्यः ।

Snayu is used as a *Sivya dravya* (suturing material) and it has been described as a *Shanaakara* by *Acharya Dalhana*. *Shana* means Jute fibers. That means *Snayu* is very tough, long, thread-like structure, it looks like jute fibres²³.

Acharya Sharangadhara mentions *Snayu* as a structure which support the body by binding *Mamsa*, *Asthi* and *Medas*.

According to *Chakrapani*, *Snayu* are binding structures in the body which are formed by *Saara bhaga* of *Ahara Rasa*.

नव स्नायुशतानि

According to *Acharya Sushruta*, *Snayu* are 900 in number.

Shaka(limbs) – 150 *Snayu* in each limb, i.e. $150 \times 4 = 600$ *Snayu*²⁴.

स्नायुश्चतुर्विधा विद्यात्तास्तु सर्वा निबोध मे ।

प्रतानवत्यो वृत्ताश्च पृथ्व्यश्च शुषिरास्तथा ॥

प्रतानवत्यः शाखासु सर्वसन्धिषु चाप्यथ ।

Acharya Sushruta has described four types of *Snayu*. *Pratanvati*, *Vrutta*, *Pruthula* and *Sushira Snayu*. *Pratanvati* means a *lata* (tendrils), a shoot, a low spreading plant, a spreading creeper with branches. These type of *Snayu* are said to be present in *Shakha* and all *Sandhi* which implies *Pratanavati* type of *Snayu* are present in joints and extremities of the body and have a branching pattern like a creeper. So, the structure which resembles are ligaments (present in all joints), Nerves (like creepers and have branching pattern). Fascia (which is wide spreading) and tendon (binding the structures)²⁴.

Snayu Prayojana (Function of Snayu):

नौर्यथा फलकास्तीर्णा बन्धनैर्बहुभिर्युता ।

भारक्षमाभवेदप्सु नृयुक्ता सुसमाहिता ॥

एवमेव शरीरेऽस्मिन् यावन्तः सन्धयः स्मृताः ।

स्नायुभिर्बहुभिर्बद्धास्तेन भारसहा नराः ॥

न ह्यस्थीनि न वा पेश्यो न सिरा न च सन्धयः ।

व्यापादितास्तथा हन्युर्यथा स्नायुः शरीरिणम् ॥

यः स्नायूः प्रविजानाति बाह्याश्चाभ्यन्तरास्तथा ।

स गूढं शल्यमाहर्तुं देहाच्छक्नोति देहिनाम् ॥

Just as a boat consisting of planks becomes capable of carrying load of passengers in river after it is tied properly with bundle of ropes, similarly all joints in human body are tied with *Snayu* by which persons are capable of bearing load. All the parts of the human body are compactly held together by *Snayu*. *Mamsa*, *Asthi* and *Meda* are held together by *Snayu*, injury to *Asthi* (bones), *Peshi* (muscles), *Sira* (vascular structure) and *Sandhi* (joints) may not be as severe as compared to *Snayu*²⁵.

सप्तविंशतिः स्नायुमर्माणि ।

Out of the 107 *Marma* mapped by *Acharya Sushruta*, 27 are classified specifically as *Snayu Marma*. Special care is taken of the *Snayu* while performing important activities like *Siravedha*. Otherwise, there is possibility of complications like *Punar Vidhha*, which leads to *Ruja* (severe pain), *Shopha*(edema), *Vaikalya*(deformity) and *Marana*(death)²⁶.

स्नायुः धनुर्ज्याबन्धनार्थं द्रव्यं 'नहारु' इति लोके ।

Snayu is the material substance that acts like a bowstring used for binding [the joints/muscles]; it is generally known as 'Nahaaru'.

References of *Snayu*, from *Sushruta Samhita* has been compiled, and correlation of these references with modern anatomy was done. Considering these references, it has been cleared that *Snayu* is a structure that is different from *Sira* (veins) and *Dhamani* (artery). *Snayu* is non contractile, less stretchable and tensile structure that which does not conduct blood.

Snayu is fibrous connective tissue present in the human body. It has various forms as per the functional requirement of the body. Tendons, aponeurosis, fascia, peripheral nerves, ligaments are the different forms of *Snayu* found in human body. Ailments of these structures will be treated with the help of *Chikitsa sutra* of *Snayugata Vata*. *Acharya Sushruta* advice *Kshoudra* (honey) *Guda* (jaggery) *Sneha* (oil), *Madhuchishta* (bee wax), for *Agnikarma* in *Snayu vikara*.

Acharya Sushruta states that physician should be more careful while treating the disease and injuries of *Snayu*. It should be carefully examined and treated without delay²⁷. These structures are *Marma adhisthana* and *Vranavastu*, which implies wound in *Snayu* is difficult to treat²⁸.

Notably, *Snāyu* possess greater strength and tensile capacity than *Sira*, enabling to secure bones, joints and other structures with remarkable firmness and maintain structural integrity under stress.

Snāyu-gata Vāta:

As *Snāyu-gata Vāta* is mentioned under *Vata vyadhi* by *Acharyas*, their *nidana* are to be taken into consideration.

***Nidana*²⁹:**

- *Ruksha, Sheeta, Alpa, laghu Ahara*
- *Ati vyayama* (excessive activities),
- *Prajagara* (excessive awaking at night),
- *Vega vidharana* (suppression of natural urges),
- *Atiplavana* (Excessive swimming),
- *Atyadhva* (Walking for long distance),
- *Ati laghana* (Excessive fasting),
- *Chinta shoka karshana* (Excessive emaciation because of affliction of diseases).

***Samprapti*³⁰:**

- *Aharaja Nidana Sevana* (*Laghu, Ruksha, Sukshma, Khara Guna dravya*) → *Prakupita Vata* → *Poorana of Vata in Rikta Srotas* → *Vata Vriddhi* → *Shoolaadi Lakshanas* → *Meda Dhatu Vikriti* → *Medo Agni Vaishamya* → *Vikrata Snayu* (*Upadhatu Dushti*)
- *Viharaja Nidana Sevana* (*Ativyayama / Aticheshta / Abhighata*) → *Sthaniya Vata Dushti* (*Rakta as underlying Dushya*) → *Dhatu Vaishamya* → *Vitiated Vata moves throughout the body* → *Sthanasamshraya in Snayu* (due to *Sroto Riktata*) → *Snayugata Vata*.

Roopa of Snayu-gata Vata:

- *Acharya Sushruta* - *Sthambha, Kampa, Shoola, Akshepa*³¹.
- *Acharya Vagbhata* - *Aayama, Gridhrasi, Kubjatha*³².
- *Acharya Charaka* - *Bahyayama, Antarayama, Khalli, Kubja, Sarvanga/ekanga roga*³³.
- *Bhavaprakasha* - *Shoola, Akshepaka, Kampa, Stamba*³⁴.

Chikitsa Siddhanta:

- *Acharya Charaka* - *Chikitsa* according to the *Lakshanas* are considered as specific treatment modality is not explained³⁵.
- *Acharya Sushruta* - *Snehana, Upanaha, Agnikarma, Bandhana, Mardana*³⁶.
- *Acharya Vagbhata* - *Snehana, Daha, Upanaha*³⁷.
- *Yogaratanakara* - *Swedana, Upanaha, Mardana, Snehana*³⁸.

Correlation as Snāyu-gata Vāta –

By above explanation as per *Ayurveda* and Contemporary science it is clear that *Snayu* is a fibrous structure with primary function of binding, which possess the stability and tensile strength which is similar to that of fascia/tendon/ligaments/aponeurosis.

When it comes to the condition of *Snayu gata vata*, it can be very well correlated with *dhatu kshayaja vata vikara*. Pathophysiology is overstretching, micro-tears, degenerative changes leading to *Vāta prakopa* in *Snāyu* as it is mainly due to degeneration(*vata*) rather inflammation(*pitta*). Hence the symptoms mentioned by the pioneers of *Ayurveda* when looked into speaks the similar to what current generation fasciitis patients are facing, it becomes clear that why in the *chikitsa siddhanta* *snehana, mardana, upanaha, bandhana* and *agnikarma* are mentioned.

Conclusion:

Snayugata Vata is a disorder involving the vitiation of *Vata dosha* affecting the *Snayu*. Factors such as *Ativyayama*, *Aticheshta* (excessive physical exertion and repetitive movements) and *Abhighata*, acts as major *nidana* responsible for the aggravation of *Sthanika Vata*. This further results in *dhatu vaishamya*, especially involving *meda* and *snayu dhatu*, ultimately leading to the manifestation of the disease.

This condition mainly develops due to repetitive strain, mechanical overuse, improper sporting techniques, and excessive occupational activities involving the lower limb.

Recurrent stress and micro trauma to the fascia contribute to degenerative changes rather than acute inflammation. From Ayurvedic perspective, *Vata prakopaka nidana*, vitiated *vyana vaayu* and *dhatu vaishamya* play a significant role in its pathogenesis.

Plantar fasciitis happens when the wrong kind of stress replaces the good kind of stress. Abnormal stress such as heel Compression by high heels, decreased ankle flexibility, high BMI, Rigid sole footwear are responsible.

Treatment should focus on changing the types of stresses being applied and encouraging normal function of the foot. Plantar fasciitis, though conventionally described as an inflammatory disorder, is now understood to be a degenerative fasciopathy rather than a true inflammation. Histopathological and clinical studies reveal features of micro-tears, collagen degeneration, and fibrosis in the plantar fascia rather than inflammatory cell infiltration.

This understanding aligns closely with the Ayurvedic concept of *Snāyu-gata Vāta*, where *Vāta doṣha* gets aggravated and localizes in *Snāyu* (fibrous structures), leading to *śūla* (pain), *stambha* (stiffness), and *kāṭīnyatā* (hardness).

By correlating the plantar fascia to *Snāyu* and the predominant symptom of heel pain to *Pāda-rujā*, it becomes evident that plantar fasciitis is best interpreted as a *Snāyu-gata Vāta vyādhi*. This correlation provides a deeper Ayurvedic rationale for the pathology and guides the line of treatment towards *Vāta-śamana*, *Snāyu-balya*, and *mārdavakara* measures rather than focusing solely on anti-inflammatory management. Thus, Ayurvedic understanding helps in redefining the disease aetiology and offers a holistic therapeutic approach for long-term recovery and tissue regeneration.

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