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## Heel pain: A systematic review with homoeopathic management

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### Abstract

Heel pain is a very common foot disease that may cause significant discomfort and disability. Biomechanic factors are the most common etiology that can induce mild to moderate chronic heel pain. Common conditions related with heel pain includes: plantar fasciitis, calcaneal spur, sever's disease, Achilles tendinopathy, heel bursitis. Location of pain can guide the proper diagnosis for the particular variety of heel pain. This review presents the current state of knowledge regarding various varieties of heel pain, including relevant anatomy, biomechanics, epidemiology, etiopathology, clinical manifestations. And role of homoeopathic medicines in the management of different conditions related with heel pain.

**Keywords:** Calcaneus, heel pain, plantar fasciitis, calcaneal spur, Achilles tendinopathy, calcaneal apophysitis, homoeopathic medicines

### Introduction

In humans the heel consists of the calcaneus/heel bone which is the largest of the tarsal bones, and forms the prominence at the back of the foot, cushioned below by a bursal sac, fat pad, and thickened skin. The calcaneus is roughly rectangular, articulating above with the talus bone of the ankle joint and in front with the cuboid, another type of tarsal bone. Posteriorly, a roughened area, the tuber calcanei, takes much of the weight in standing. On one side of this is a small protuberance, the lateral process, developed only in humans, related to balance in the upright position. The Achilles tendon/tendo calcaneus attaches to the posterior border of the calcaneus. The tendon is formed from the gastrocnemius and soleus muscles and is inserted into the heel bone. The contracting calf muscles lift the heel by this tendon, thus producing a foot action that is basic to walking, running, and jumping. The Achilles tendon is the thickest and most powerful tendon in the body. It is vulnerable to tendonitis, tear, and rupture. Microtears, which may be caused by acute injury or by chronic strain, produce pain and swelling. If the tendon is completely torn, or ruptured, use of the leg for running and jumping is lost for an extended period of time. Tendon ruptures frequently require surgery and immobilization of the ankle for weeks or months. Heel pain is a general term used to describe pain and discomfort experienced anywhere in or around the rear of the foot <sup>[1]</sup>. It has been estimated to affect about 10% of runners and present in the general population at the same rate. Heel pain has long been recognized as highly prevailed in the senior population, which impacts approximately one third seniors older than 65 years. Heel pain is the most common in active people over the age of 40. This increased prevalence may result from a decrease in the elasticity of the plantar fascia and a slowing of the healing process with age. Heel pain also is relatively common in active children and adolescents between the ages of 8 and 13. Athletes are at the most risk to develop heel pain conditions and it is the most frequent injury in ballet dancers. Active routines such as running and jumping can put constant strain on the heel, on various muscles, ligaments all over the foot, ankle, and calf, which can lead to significant tissue damage. Improper muscle flexibility, increased foot pronation, and leg- length discrepancy are other predisposing factors for this condition. In addition, other factors of a person's lifestyle, such as work that regularly requires heavy lifting, obesity can cause heel pain because excess pounds stress the heels. Flat foot conditions can adversely affect the heels of the feet and lead to damage and serious pain. Heel pain is not uncommon in pregnant mothers because as the pregnancy progresses there is weight gain and this extra weight puts more stress on the heel <sup>[2, 3]</sup>.

### Epidemiology

Heel pain is a common symptom in the general population, particularly in older adults. The prevalence in adults ages  $\geq 18$  years ranges from 17–24% rising to as high as 42% in adults ages  $>65$  years. Three-quarters of older adults with heel pain experience disabling pain affecting them on most days and heel pain is also linked to problems with mobility and gait in this age group, with an increased risk of falling [2].

### Etiology

There are many causes of heel pain that can induce mild to moderate chronic heel pain. Biomechanic factors are the most common etiology of heel pain. Other causes include injury-related, neurologic, arthritic, infectious, neoplastic, autoimmunological, and other systemic conditions.

**1. Plantar heel pain:** Pain beneath the heel is caused due to following conditions - plantar fasciitis, calcaneal spur, fat pad insufficiency, calcaneal apophysitis. Degenerative disk disease with radiation toward heel, systemic disease - reiter's syndrome, psoriatic arthritis, posttraumatic – acute tear of plantar fascia, calcaneal fracture.

**2. Posterior heel pain:** Pain behind the heel is caused due to following conditions - retrocalcaneal bursitis, Achilles tendinopathy [11].

### Plantar fasciitis

It is the inflammation of a thick band of tissue which is known as plantar fascia and it runs across the bottom of foot connecting heel bone to toes. Plantar fasciitis is the most common cause of chronic pain beneath the heel in adults, making up to 11–15% of the foot symptoms requiring professional care among adults. It is estimated that 1 in 10 people will develop plantar fasciitis during their lifetime [2].

**Etiology:** more common in middle-aged obese females and young male athletes. Obesity is present in up to 70% of patients. Heel spurs have commonly been implicated as a risk factor. Pronated foot posture and over-pronation during gait are common causative factors.

**Types:** Insertional plantar fasciitis – also known as heel pain syndrome where pain is felt at the medial calcaneal tubercle and diffuse plantar fasciitis – pain is felt diffusely over the heel and the sole of the foot.

**Clinical features:** the patient complains of pain in the medial side of the heel, most noticeable with initial steps after a period of inactivity and usually lessens with increasing level of activity during the day, but will tend to worsen toward the end of the day. Symptoms may aggravate following prolonged weight bearing, and often precipitated by increase in weight bearing activities. Usually unilateral, but up to 30% of cases have a bilateral presentation. Tightness of achilles tendon is found in almost 80% of cases [4]. The patient complains of pain in the heel, which is more in the morning because during sleep, foot is in plantar flexed position causing shortening of the plantar structures and sudden dorsiflexion in waking up from the night's sleep stretches the structure abruptly causing pain. It gradually subsides as the patient takes a few steps. The pain increases on prolonged standing, walking. Occasionally the pain may

spread to the whole of the foot including the toes. Tenderness can be elicited over the medial calcaneal tuberosity and may exaggerate on dorsiflexion of the toes or standing tip toe. Passive stretching of the toes increases pain in the heel [3,4].

**Diagnosis:** based on medical history and physical examination. Location of pain and areas of tenderness forms the basis of diagnosis.

### Calcaneal spurs

It is commonly known as a heel spur and occurs when a bony outgrowth is formed at the anterior edge of the calcaneal tuberosity. The dorsal spurs are often associated with achilles tendinopathy while spurs under the sole are associated with plantar fasciitis. The apex of the spur lies either within the origin of the planter fascia on the medial tubercle of the calcaneus or superior to it in the origin of the flexor digitorum brevis muscle. The relationship between spur formation, the medial tubercle of the calcaneus and intrinsic heel musculature results in a constant pulling effect on the plantar fascia resulting in an inflammatory response [2,3].

**Etiopathology:** abnormal biomechanics i.e. excessive or abnormal pronation is the prime etiological factor for a painful plantar heel and inferior calcaneal spur. The origin of the spurs appears to be caused by repetitive trauma which produces micro tears in the plantar fascia near its attachment and the attempted repair leads to inflammation which is responsible for the production and the maintenance of the symptoms. Heredity, metabolic disorders, tuberculosis, systemic inflammatory diseases and many other disorders also contribute towards development of these spurs.

**Other causes include:** repeated attacks of plantar fasciitis, repeated trauma, constant pulls of shortened plantar fascia, ill-fitting footwear, fibromatosis of plantar fascia [1,3].

**Types: dorsal heel spur/retrocalcaneal spur** - calcaneal spurs are located at back of heel and **plantar heel spur** - calcaneal spurs are located under the sole.

**Clinical features:** the patient complains of pain over ball of the heel, tenderness on plantar aspect of the heel, slight swelling at the attachment of plantar fascia due to fibrositis or traumatic detachment of plantar fascia. Pain is mostly localised in the area of the medial process of the calcaneal tuberosity. The condition may exist without producing symptoms, or it may become very painful, even disabling. Pain aggravates during weight-bearing activities, in the morning or after a period of rest.

**Diagnosis:** radiograph-lateral view of the heel shows prominent bone spike arising from calcaneum.

### Calcaneal fat pad syndrome

The heel/calcaneus bone is cushioned and supported by a layer of fat known as the calcaneal fat pad, which is normally about 1-2 cm in thickness. It is made up of fatty tissues that are enclosed by ligamentous chambers. During the human gait cycle of walking, standing, jumping and running, our heel pads act as cushions protecting our heel bones, nerves and blood vessels from damage by absorbing

the shock of the impact of our feet on the ground. Our heel fat pad also serves as a mechanical anchor that helps to distribute our weight appropriately without putting too much pressure on the underlying tissues. The atrophy of the heel pad is considered to be the second leading cause of plantar heel pain after plantar fasciitis<sup>[9, 10]</sup>.

**Etiopathology:** Heel fat pad syndrome is a condition that happens as a result of changes in the elasticity and the thickness of the heel fat pad, this is often caused by wear and tear over time of the fatty tissues that make up the heel pads on our feet causing pain that could impact our daily routine and interfere with our regular activities. Process of aging affects the thickness and elasticity of our feet heel fat pads. As we get older and with use, more commonly after the age of 40 years, the fatty tissues cushioning our heel start to break down, with loss of collagen, water, and elastic tissues, reducing the shock absorbency and leaving us more susceptible to pain and heel bone bruising. Injury of the heel fat pad can also lead to heel pad syndrome, plantar fasciitis, excess body weight, corticosteroid injection, improper footwear, prolonged wearing of high heels or walking barefoot can also contribute to the development of this condition, walking or exercising on hard surfaces increases the shock that the heel receives on impact, increasing the possibility of thinning heel fat pads. Activities such as running, jumping, gymnastics, and prolonged standing or walking, can cause chronic overload on the fatty tissues of the heel pad leading to inflammation and a higher risk of developing heel pad syndrome. Genetics or family history: are factors that could be strongly associated with excessive fat pad loss. Other health conditions such as: rheumatoid arthritis and lupus can affect the connective tissue in the feet. Diabetes mellitus has also been associated with higher incidences of heel pad syndrome due to adipose tissue atrophy and degeneration of the collagen in this area<sup>[10, 11]</sup>.

**Clinical features:** deep dull aching pain in the heel, typically in the middle of the calcaneus bone which would be around the center of the heel. The pain experienced is often felt as if there was a bruise in the heel pad when pressing on the heel while walking, running or standing for a long time. Mild cases of heel pad syndrome might be asymptomatic, or felt occasionally when aggravated by prolonged walking or standing, particularly when barefoot, walking on hard surfaces, or while performing any high-impact exercise<sup>[10]</sup>. Less common symptoms could include tingling, cold or burning sensation which tend to be a result of a neurological cause as nerves that are located in the superficial regions of the heel can be easily compressed after atrophy of the heel fat pad.

**Diagnosis:** based on medical history and physical examination. X-rays helps to rule out other conditions that can cause similar symptoms.

### Calcaneal apophysitis

Calcaneal apophysitis is a painful inflammation of the heel's growth plate. It typically affects children between the ages of 8 and 14 years because the heel bone is not fully developed until at least age 14. Until then, new bone is forming at the growth plate which is a weak area located at the back of the heel. When there is too much repetitive

stress on the growth plate, inflammation can develop.

**Etiopathology:** overuse and stress on the heel bone through participation in sports is a major cause of calcaneal apophysitis. The heel's growth plate is sensitive to repeated running and pounding on hard surfaces, resulting in muscle strain and inflamed tissue. For this reason, children and adolescents involved in soccer, track, or basketball are especially vulnerable. Occurs more commonly in children who over-pronate, and involves both heels in more than half of patients. Other potential causes of calcaneal apophysitis include obesity, a tight achilles tendon, and biomechanical problems such as flatfoot or a high-arched foot<sup>[11]</sup>.

**Clinical features:** pain in the back or bottom of the heel, limping, walking on toes, difficulty running, jumping, or participating in usual activities or sports. Pain when the sides of the heel are squeezed, walking typically makes the pain worse, tiredness.

**Diagnosis:** to diagnose the cause and rule out other more serious conditions, thorough medical history and questions about recent activities are required. X-rays are often used to evaluate the condition. Other advanced imaging studies and laboratory tests may also be ordered.

### Achilles tendinopathy

The Achilles tendon ranks as the strongest tendon in the human body. This tendon connects the plantaris, gastrocnemius, and soleus to the calcaneus bone. It allows the calf muscles to act on the heel, which is necessary for walking or running<sup>[6]</sup>.

The term "achilles tendinopathy" refers to tendinitis which is acute inflammation of the Achilles tendon and tendinosis which is chronic inflammation of the Achilles tendon. It is characterized by pain, inflammation, and stiffness of the Achilles tendon and over time there is thickening of the tendon and loss of elasticity.

**Etiopathology:** Achilles tendinopathy is more likely to be found in the individuals who participate in the physical activities such as running and jumping. It may affect 9% of recreational runners and cause up to 5% of professional athletes to end their careers. Chronic Achilles tendinopathy is more common in older people than in young people. The pain is related to an alteration of the mechanical properties of tension and rigidity of the aponeurosis of the Achilles tendon<sup>[6, 7]</sup>. The risk factors of Achilles tendinopathy can be divided into intrinsic and extrinsic factors. Intrinsic factors include biomechanical abnormalities of the lower extremity such as leg length discrepancy hyperpronation, varus deformity of the forefoot, pes cavus and limited mobility of the subtalar joint and systemic conditions such as increasing age, inflammatory arthropathies, corticosteroid use, diabetes, hypertension, obesity, gout. Extrinsic factors include excessive mechanical overload and training errors such as increased interval training, abrupt changes in scheduling, excessive hill training, training on hard or sloping surfaces, increased mileage, increased repetitive loading, poor shock absorption, acute rupture any direct injury with a sharp object can injure this tendon.

**Clinical features:** localized pain, focal or diffuse sensitivity in heel region, swelling, stiffness/morning pain, perceived

rigidity in the Achilles tendon. In acute tears, the patient complains of pain and swelling in the region of the tendon. The patient is unable to walk. However, in incomplete tears, when the patient is instructed to stand over the tiptoes, there will be a definite heel lag. Tenderness can be elicited and a gap is felt during a complete tear. Dorsiflexion is exaggerated, but plantar flexion is diminished; but never totally absent due to the residual action of tibialis posterior, toe flexors and the peroneals [6, 8].

**Diagnosis:** lateral and axial calcaneus x-rays: may detect calcifications in the proximal extension of the tendon insertion or bony prominences in the upper portion of the calcaneus. It can also help exclude pathological bone tumors.

Ultrasound: can help assess injury to the tendon and can be used to predict the risk of tendinopathy and rupture. It reveals increased thickness of the Achilles tendon with hyperemia associated with hypervascularity, a decrease in the gastrocnemius-soleus rotation angle and a decrease in the length of the kager fat pad [8].

#### **Retrocalcaneal bursitis**

It is the inflammation of the bursa located between the calcaneus and the anterior surface of the Achilles tendon. A bursa appears at a junction of a tendon on the bone and is filled with a thin layer of synovial fluid. The structures near the bursa can move with minimal friction due to irritation. The retrocalcaneal bursa is saddled over the posterior-superior prominence of the calcaneus under the Achilles tendon and its lateral expansions. At this site the bursa and the bone are so intimately related that a prominence of the calcaneum will greatly predispose to mechanical irritation of the bursa and the tendon [7].

**Etiopathology** Retrocalcaneal bursa may occur traumatically from a fall, sport related impact, contusion or it can also present as gradual onset due to repetitive trauma to the bursa from activities including running or excessive loading.

**Other associated conditions:** gout, rheumatoid arthritis, and seronegative spondyloarthropathies. In some cases, retrocalcaneal bursitis may be caused by bursal impingement between the Achilles tendon and an excessively prominent posterosuperior aspect of the calcaneus which is known as Haglund deformity [6].

**Clinical features:** pain at the back of the heel especially when running uphill, pain may get worse when rising on the toes, tenderness and swelling at the back of heel, increase in pain in activities which load the calf.

**Diagnosis:** includes evaluation of the tendon, bursa and calcaneum by, careful history, inspection of the region for bony prominence and local swelling as well as palpation of the area of maximal tenderness. Plain radiographs of the calcaneus may reveal a Haglund deformity. Magnetic resonance imaging (MRI) demonstrate bursal inflammation.

#### **Homoeopathic management – Heel pain**

The use of homoeopathic medicines requires keen observation of specific characteristics feature of case of disease, in order to resolve it within the shortest period of

time. While dealing with acute as well as chronic cases, holistic approach must be adopted by the physician in order to permanently cure a given case of disease. Homeopathic medicines are selected after a full individualizing examination and case-analysis, which includes the medical history of the patient and physical examination. The medicines given below indicate their therapeutic affinity in various conditions related with heel pain, and while giving importance to these symptoms other peculiarities related with the mental and physical constitution of the patient should also be taken into consideration in order to reach effective and permanent cure.

#### **Alumina**

Pain as from fatigue in the joints of the feet when seated. Pains in the soles of the feet when walking. Sensation of burning under the toes. Heels feel numb. Soles tender; on stepping, feel soft and swollen. Worse, in morning on awaking; warm room- better, in open air; from cold washing; in evening [17].

#### **Argentum metallicum**

Pain as of bruising and throbbing in the joints of the feet. Cramp-like pain in the bones and in the joints of the feet and toes. Tearing in the bones of the feet and toes. Sensation of numbness in the heel and in the tendo achilles with swelling of ankles [20].

#### **Ammonium muriaticum**

Pain of ulceration and pulling in the heels. Sudden jerks, pullings, or shootings, throbbing and tingling in the extremity of the toes. Tension in the joints, as from shortening of the muscles. Very severe ulcerative pain in the heel, > by rubbing. The feet get very cold in the evening in bed [16].

#### **Berberis vulgaris**

Lymphatic swelling of the tendo Achilles, with pains on lifting the foot, and a sensation as if the foot were bearing a heavy load. Swelling of the foot after movement, with sensation of burning, swelling of the heel, and cramp in the foot. Sensation of dislocation in the joints of the toes. Heels pain as if ulcerated on standing. Stitches between metatarsal bones, as from a nail when standing. Tearing in balls of feet, with pain when stepping on them [16]. Burning pain in the soles of the feet, ESP. In the evening. Drawing, acute, or burning pains in the toes. Pain in balls of feet on stepping. Intense weariness and lameness of legs after walking a short distance.

#### **Benzoicum acidum**

Sharp pain in left ankle, when weight is on left foot on walking. Severe pain in left tendo Achilles close to os calcis when weight is on that foot. Pain in right tendo Achilles and in heart region at same time. Tearing and stitches, ESP. In the metatarsal joints of the right great toe. Pain in tendo Achilles worse, in open air; by uncovering [22].

#### **Bryonia Alba**

Pain, as of dislocation, in the foot when walking. Swelling of the feet, with redness and heat; pain, as from a bruise, on stretching the feet, tension on moving them; and pains, as from ulceration, on being touched. Shootings in the feet, the soles of the feet, and the toes, ESP. When resting on the

foot. Burning in soles of feet at night. Ulcerative pain in soles; cannot step <sup>[20]</sup>.

### **Causticum**

Pains in the instep, in the ankle bones, in the soles of the feet, and in the toes, on walking. Neuralgic pains in the soles of the feet. Contraction in the instep, with tensive pain when stepping. Swelling of the feet. Tingling in the soles of the feet <sup>[20]</sup>.

### **Ledum palustre**

Stiffness of feet with pain in soles, when walking, as if they were galled; as if filled with blood. Inflammatory or else œdematous swelling of legs and feet. Incisive pains in toes, while asleep at night. Ankles swollen. Soles painful, can hardly step on them <sup>[16]</sup>.

### **Mercurius solubilis**

Swelling of instep or heels, with sharp or shooting pains. Wrenching pains in foot. Coldness and sweat in feet. Painful swelling of metatarsal bones. Swelling of toes. Bone-pains and in limbs; worse, night <sup>[22]</sup>.

### **Natrum sulphuricum**

Tearing and drawing in legs, and ESP. In tendo-achillis and calf. In heels lancinating pain, tearing and ulcerating pain. Great lassitude and uneasiness in feet. Shooting tearing, and pain as from ulceration in feet. Burning in soles; œdema of feet rheumatism, worse in damp cold weather -better, dry weather, pressure, changing position <sup>[16]</sup>.

### **Pulsatilla nigricans**

Hot swelling of legs, or only of the back or of soles of feet, sometimes with shooting pains when the parts are touched, and during movement. Painful sensation of numbness in soles of feet and in balls of the toes <sup>[17]</sup>. (dematous swelling of feet, < in evening. Piercing shootings and incisive pains in heels towards evening. Shootings in soles of feet and extremities of toes. Boring pain in heels toward evening; suffering worse from letting the affected limb hang down.

### **Rhododendron**

Dropsical swelling of legs and feet. Feet and legs as if asleep. Drawing and tearing in legs and feet as if in periosteum; ESP. During repose. Excessive coldness of feet, even in a warm room; cannot be got warm in bed; prevents sleep. Pain in tendo-achilles on stepping. Sensation as if heavy weight were hanging to feet. All symptoms reappear in rough weather, night, towards morning. Better, after the storm breaks, warmth, and eating <sup>[20]</sup>.

### **Rhus toxicodendron**

Swelling, stiffness, and paralysed sensations in joints, from sprains, over-lifting, or over-stretching. Lameness, stiffness, and pain on first moving after rest, or on getting up in morning; > by constant motion. Pains tearing in tendons, ligaments, and fasciæ. Tingling in feet. Shootings and wrenching pain in ankle bones when resting on foot. Swelling of feet in evening. Numbness and paleness of feet <sup>[16]</sup>.

### **Ruta graveolens**

Burning, gnawing pain in bones of the feet, which does not

permit standing or walking. Paralytic stiffness of instep. Pain and tenderness in soles, aching in ankles and very acute shooting in back of left heel, tendons sore. Aching pain in tendo-achilles. Pain in bones of feet and ankles <sup>[16]</sup>. Great restlessness. Worse, lying down, from cold, wet weather.

### **Sabina**

Intermittent aching on left heel, lower part where it joins the sole. Sharp stitches from within out on right and left heel. Pressive tearing in bones of feet. Shooting in heels and metatarsal bones. Arthritic pain in joints <sup>[20]</sup>.

### **Valeriana officinalis**

Drawing and weak feeling along tendo Achilles, toward heel, as if the part had lost all strength, when sitting; disappearing when rising from a seat. Constant pain in heels. When sitting heels, esp. right painful. Drawing in the joints of the feet when sitting down. Sudden pain, as if bruised, in outer malleolus of right foot, < when standing, > when walking. Wrenching pain in the joints of the foot and ankles. Transient pain in right ankle, < while standing, but seems to disappear when walking. Pains and shootings in heels, ESP. When seated <sup>[19]</sup>.

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