IAMJ

INTERNATIONAL
AYURVEDIC
MEDICAL JOURNAL

Research Article | ISSN: 2320 5091 | Impact Factor: 5.344

JALAUKĀVACARAṆA IN PLANTAR FASCIITIS

Veena K Nambiar[1], **George M. J**[2]

[1]Final yr. PG scholar, [2]Professor and HOD
Department of Shalyatantra
Vaidyaratnam P. S. Varier's Ayurveda College, Kottakkal, Kerala, India

Corresponding Author: veenakarun@gmail.com

https://doi.org/10.46607/iamj2308102020

(Published online: October 2020)

Open Access

Article Received: 30/09/2020 - **Peer Reviewed:** 02/10/2020 - **Accepted for Publication:** 04/10/2020

Check for updates

ABSTRACT

Plantar fasciitis is a disorder that results in pain in the heel and plantar surface. Chronic inflammation of posterior bony attachment of the plantar aponeurosis is known as plantar fasciitis. As per statistics, 1 in 10 people develop heel pain at some point in their life. Out of heel pain from all causes, 80% is due to plantar fasciitis. People are advised to take rest, physiotherapy, orthotics, splinting or steroid injections. Despite proper management in modern medicine, reoccurrence rate is more. Hence it is relevant to find out a method of management of this condition using *Ayurveda.* The causative and risk factors create a cumulative micro trauma to plantar fascia and it may be considered as *Vraṇa* and the inflammatory changes in plantar fascia may be considered as *Vraṇa Śōpha*. For inflammations with recent origin bloodletting should be carried out to reduce pain and obviate suppuration. So *Jalaukāvacaraṇa* was done as it is a non-invasive, patient compliant and time saving procedure. A total number of 20 participants with the symptoms of plantar fasciitis were selected and evaluated, by taking detailed history and clinical examination. The study was conducted at Shalyatantra OPD of VPSV AVC, Kottakkal. *Jalaukāvacaraṇa* was done on 1st, 8th and 15th days. Clinical assessments were done on 1st, 8th, 15th 22nd and 43rd days. On statistical analysis, it was found that the *Jalaukāvacaraṇa* shows 67.85 % of effect in the management of plantar fasciitis. *Jalaukāvacaraṇa* is having more efficacy in acute cases (duration within 6 months), as *Raktaviśrāvaṇa* is indicated for recent inflammations.

Keywords: Plantar fasciitis, *Vraṇa Śōpha, Jalaukāvacaraṇa*

INTRODUCTION

Plantar fasciitis is a disorder that results in pain in the heel and plantar surface. Chronic inflammation of posterior bony attachment of the plantar aponeurosis is known as plantar fasciitis[1]. Pain is severe on walking after a period of rest and is also frequently brought on by bending the foot and toes up towards the shin. Diagnosis may be confirmed by palpation over plantar fascia's insertion on medial heel. Risk factors include excessive running, standing on hard surfaces for prolonged period of time, high arches of feet, presence of leg length inequality and flat feet. The tendency of flat feet to excessively roll inwards during walking or running makes them more susceptible to plantar fasciitis[2]. Plantar fasciitis is one of the commonest presentations in our clinics. As per statistics, 1 in 10 people develop heel pain at some point in their life. Out of heel pain from all causes, 80% is due to plantar fasciitis. 70% of people present with unilateral heel pain.

Most of the cases of plantar fasciitis resolve with conservative management. People are advised with rest, physiotherapy, orthotics, splinting or steroid injections. If all other measures do not work, extracorporeal shortwave therapy or surgery may be tried[3]. Despite proper management in modern medicine, reoccurrence rate is more. Hence it is relevant to find out a method of management of this condition using *Āyurvēda*.

The causative and risk factors create a cumulative micro trauma to plantar fascia and its effect may be considered as *Vraṇa*. The inflammatory changes taking place in plantar fascia may be considered as *Vraṇaśōpha*. In Suśṛuta Saṃhita *Vraṇapraśna adhyāya, Śrama* and *Abhighāta* are considered as two of the causes of *Rakta Kōpa*.[4] As the *Dōṣas* prompt the concomitant vitiation of *Rakta*, it may be considered that blood is the medium for *Dōṣa Prakōpa*.[5] This condition in plantar fascia usually presents with local inflammatory changes in the heel, so *Raktamōkṣa* may be carried out to alleviate it. As the foot is the weight bearing part in our body, the *Vraṇa* occurred in the plantar fascia may get less time to heal. This may end up in chronicity and *Vāta* vitiation may happen. *Vraṇa* the term is derived from the verb root *"Vraṇa Gātravicōrṇane*"; which means that it causes damage to the body. There are eight sites where ulcerative lesions may occur: *Twak* (skin), *Maṃsa* (muscles), *Sira* (vessels), *Snāyu* (ligaments/tendons), *Asthi* (bones), *Sandhi* (joints), *Kōṣṭa* (internal organ), *Marma* (vital parts).[6] As explained in the classics, *Ṣaṣti Upakrama* is the treatment for all *Vraṇa*.

Another prevailing concept regarding plantar fasciitis is *Vātakaṇṭaka.* It is a painful disorder affecting the *Gulpha*. Here *Vāta* gets aggravated due to exertion and walking on uneven surfaces, and it takes the *Āśṛaya* as *Gulpha* and produces pain. As the pain is seen more during morning and after a period of inactivity or rest, it indicates the *Saṃsarga* of *Kapha* or presence of *Āma* with the *Vāta.* Here production of *āma* is expected from the *Āvaraṇa* of *Kōṣṭāgni* by aggravated *Vāta* as explained by Caraka in *Nidānasthāna*. *Dūṣyas* of *Vātakaṇṭaka* are *Snāyu* and *Sandhi* and *Rōgamārga* is considered as *Madhyama.*[7] With this pathology and clinical presentation *Vātakaṇṭaka* may be effectively paralleled with plantar fasciitis. Pathology reveals chronic inflammation of plantar fascia and degeneration of fibrous tissue with or without fibroblast formation. Patients suffering with *Vātakaṇṭaka* experience severe pricking (*Kaṇṭakavat*) pain in *Pādatalapradeśa* [8].

The disease may present in two ways according to the involvement of *Dōṣa*. They are *Kevala Vātika* and *Kapha Vātika*. By *Vātakara Nidāna* like *Śrama, Abhigāta,* over exertion etc leads to *Dhātukṣaya* and *Vātakōpa.* In participants with increased BMI, *Kaphavardhaka Nidana* caused by sedentary lifestyle, *Snigdhahara* etc. lead to *Kaphakōpa* which further leads to *Āvaraṇa* of *Vāta* by *Kapha*. This may be the *Saṃprāpti* happening in *Sthaulya* patients. This may further vitiate *Vāta* resulting in the disease.

According to Bhaishajya ratnavali, the treatment of *Vātakaṇṭaka* are *Raktāvasēchana, Ēraṇḍataila Pāna* and *Dahana.* As *Vātakaṇṭaka* is a *Vāta Nānātmaja*

Vyādhi, we can provide *Sāmānya Vāta Cikitsa* for it. The general line of treatment mentioned for *Vātavyādhi* in Ayurvedic classics include *Snehana* (both internal and external), *Swēdana, Mrudusaṃśōdhana*. Caraka states that, depending on the location and *Dūṣhya* (tissue element vitiated by *Vāta*) each patient should be given specific therapies. Above all, the main approach is *Nidānaparivarjana* itself. Avoidance of causative factors such as excessive walking, running etc. is of prime importance in the prevention as well as cure of disease.[7] In treatment, care should be taken in avoiding the factors those are responsible for the vitiation of *Dōṣa*, which in turn help in *Saṃprāpti Vighaṭana*.

For inflammations with recent origin bloodletting should be carried out to reduce pain and obviate suppuration. *Raktavisrāvaṇa* i.e., bloodletting is one of the ancient and important para surgical procedures described in *Āyurvēda* for the treatment of various diseases. Of them, *Jalaukāvacaraṇa* or leech therapy has gained greater attention globally, because of its medicinal values. Leeches derive their name (*Jalauka*) from their total dependence upon water. Since *Jala* is their life they are also called *Jalāyuka*. According to Suśṛuta, it is one among *Ṣaṣṭi Upakrama* and is considered as *Śṛeṣṭha Anuśastra*. *Jalaukāvacaraṇa* is best among five *Raktavisrāvaṇa* methods, because it is easy and convenient to the patients. Many studies have found that leeches have various bioactive molecules in their secretions. More than 20 molecules and their modes of action have been identified, but there are many more awaiting explorations. These molecules have analgesic, anti-inflammatory, platelet inhibitory, anticoagulant, and thrombin regulatory functions, as well as extracellular matrix degradative and antimicrobial effects.[9]

Methodology

Study setting was Shalyatantra OPD of VPSV Ayurveda College, Kottakkal. 20 participants satisfying the diagnostic, inclusion and exclusion criteria were selected for the study.

a) Diagnostic criteria

Clinical - based on signs and symptoms

Heel pain

Stiffness

Heel tenderness

Windlass provocative test

Revised Foot Function Index

Investigations

Blood examination- Blood Routine Examination, Clotting Time, Bleeding Time, Erythrocyte Sedimentation Rate, Random Blood Sugar, RA factor, Serum uric acid.

X-ray – to rule out calcaneal stress fracture and to know the presence of calcaneal spur.

b) Inclusion criteria

Pain in heel and plantar aspect of foot on keeping first step in the morning and following a period of rest, with or without local tenderness and stiffness.

Irrespective of gender.

Age group: 21- 60.

c) Exclusion criteria

Calcaneal stress fracture

Rheumatoid arthritis

Gout

Neoplastic conditions

Nerve entrapment syndromes

Diabetes mellitus

Hypertension

Subjects with impaired circulation to lower extremities

Corticosteroid injections to heel, preceding 3 months

Patients on anticoagulation therapy

Patients who are contraindicated for *Raktavisrāvaṇa*[10].

Detailed history with aggravating and relieving factors were taken in each case. The *Jalaukāvacaraṇa* was done on 1st, 8th and 15th days. Assessments were done on 1st, 8th, 15th, 22nd and 43rd days. Foot X-ray was taken for every patient prior to the commencement of the study to know the association of calcaneal spur with the disease as well as to exclude calcaneal fractures. Follow up was done for 28 days. Pain after rest, pain in the morning, tenderness, stiffness, windlass mechanism, revised foot function index was graded as per the grading scale. The statistical analysis of the results was done.

Intervention (Method of *Jalaukāvacaraṇa)*

Nontoxic leeches (*Nirviṣa Jalauka)* weighing 10-12grams each were selected for the study. Site for leeching in the heel was the nearest area of maximum tenderness where the leech bites and the part were

cleaned with lukewarm water. For two minutes, the *Jalauka* was put in a kidney tray containing water mixed with *Haridra Cūrṇa*. Then the *Jalauka* was kept in fresh water for 45 minutes. Each leech was weighed separately prior to the application. Participants were asked to lie comfortably. *Jalauka* was picked with wet cotton and was placed on the site. It was made sure that *Jalauka* has bitten by seeing the *Aswakhuravat Ānana* posture. A small prick was made at the heel with a lancet to make it conducive for the *Jalauka* to bite. As the *jalauka* sucks blood, its body was covered with moist cotton. It was observed for *Samyak Lakṣaṇa*. *Jalauka* was allowed to stay till it detaches by itself. When the *Jalauka* did not detach itself, we waited till *Tōdakaṇḍu Prāduṛbhāva* or for a maximum of 45 minutes and then *Saindhava* was sprinkled on the mouth of *Jalauka*. Then it was transferred to a kidney tray and the leeches were weighed individually to calculate the amount of blood it has sucked. Bite site was cleaned using a wet cotton and bandaged after applying *Śatadhauta Ghṛta*. Turmeric powder was sprinkled on the mouth of *Jalauka* and it was gently pressed from tail to head so as to vomit the sucked blood. *Jalauka* was cleaned and transferred to clean water. Satisfactory vomiting was made sure by the leech's mobility and its desire to eat[10].

Figure 1 *Jalaukāvacaraṇa*

Observation and Analysis

Table 1: Data obtained after statistical analysis

Variables	D1		D8		D15		D22		D43	
	Mean±Std. Deviation	P value	Mean±Std. Deviation	P value	Mean±Std. Deviation	P value	Mean±Std. Deviation	P value	Mean±Std. Deviation	P value
Pain after rest	7.25±1.99	<0.001	5.7±1.83	<0.001	3.75±1.51	<0.001	2.7±1.38	<0.001	2.2±1.22	<0.001
Pain in the morning	7.75±1.01	<0.001	6.2±1.39	<0.001	4.15±1.38	<0.001	2.85±1.26	<0.001	2.25±1.12	<0.001
Tenderness	1.60±0.68	<0.001	1.00±0.72	<0.001	.35±0.48	<0.001	.25±0.44	<0.001	.05±0.10	<0.001
Stiffness	0.65±0.74	<0.001	0.30±0.47	<0.001	0.10±0.30	<0.001	0.00±0.00	<0.001	0.00±0.00	<0.001
Windlass mechanism	0.95±1.05	<0.001	0.70±0.86	<0.001	0.40±0.50	<0.001	0.05±0.22	<0.001	0.02±0.10	<0.001

Table 2: Data obtained after statistical analysis on revised foot function index

Revised foot function Index	D1	D8	D15	D22	D43
Plantar heel pain index	3.57	2.78	1.83	1.31	1.20
Disability index	4.01	3.20	2.13	1.51	1.31

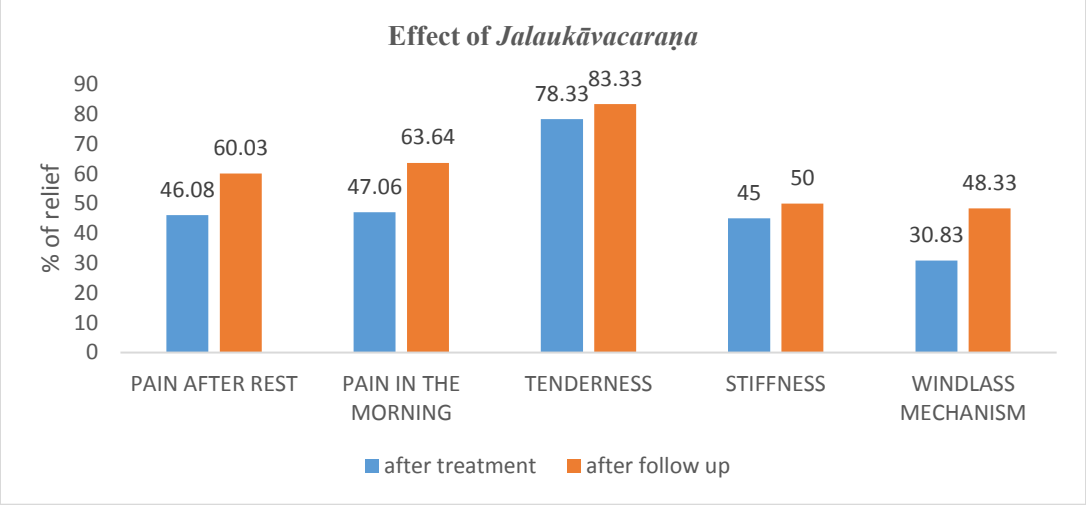

Figure 2:

DISCUSSION

In this clinical study, participants belonging to the age group of 21-60 years were included. Majority of participants were between 41- 50 years (50%). 30% participants were in the age group 31-40. The Journal of the American Osteopathic Association also reported that the peak incidence of plantar fasciitis occurs in persons aged between 40 and 60 years.[11] From 'middle-age' (40) onwards, the arch of the foot begins to sag and this explains why the incidence of plantar fasciitis increases with age (peak incidence occurs in patients aged between 45 and 64 years-old). Majority of participants (80%) in this study were females. In a study conducted by Christopher W. Reb et al. also reported that there is high prevalence of female gender in patients with plantar fasciitis.[12] Majority of participants were housewives (70%) and 20% participants were teachers, drivers and manual workers. These groups are habituated with prolonged standing, sitting and walking. Moreover, according to Riddle et al., occupations requiring prolonged weight bearing have been considered a risk for plantar fasciitis due to repetitive tensile load placed on the fascia[13]. Standing and walking are the two most common occupational activities involving 30 to 40 percent of time at work of the working population. 42.5 % participants from our study were obese. According to the literature, there is a strong association between increased body mass index (BMI) and PF in a non-athletic population[14]. Many obese patients find it difficult to implement stretching exercise techniques, and this is often because of the added weight that is carried around, meaning that obesity and heel pain can become a vicious cycle.[12]

Out of 40 participants, 47.5 % were having constipated bowels. The chi-square test was performed and was found that, the bowel habits have an association with pain in the morning and tenderness. Constipated bowels have shown a positive association with pain in the morning as the test was highly significant at $p<0.001$ for pain in the morning, with a chi square value of 45.238. The test was significant at $p<0.05$ for tenderness, with a chi square value of 12.651 which indicates the association. According to Ashtanga hridaya, *Pakwāśaya, Kati, Sakti, Srōtra, Asthi, Sparśanendriya* form the seats of *Vāta*. Further in the *Hridayabodhika* commentary it is stated that, even though the *Dōṣas* are present all over the body, each *Dōṣa* has its own highly

specific abode, of which the abode of *Vāta* is *Pakwāśaya*. The loaded bowel may cause *Vātakōpa* in *Pakwāśaya* and so *Pakwāśaya Gata Vāta* symptoms may occur, which includes *Adhakāya Upadrava*. According to A.H Su 1/8, it is explained that each *Dōṣa* exhibits diurnal variations. If the time is divided into three equal parts, either of day or night, *Vāta, Pitta* and *Kapha* shows predominance during the last, middle and first parts respectively. Among these, *Kapha* is having predominance in the morning and early part of night. As the pain is usually seen in the morning and after a period of rest, the *Samsarga* of *Kapha* or *Āma* with *Vāta* may be present. *Dōṣa Kōpa* occurred in the *Kōṣṭa* may have travelled through body channels and *Sthānasraṃśṛaya* might have happened in the plantar fascia. In this disease, the plantar fascia has undergone cumulative micro trauma which resulted in the micro tears. This part of discontinuity in the plantar fascia which is a *Vraṇa* may act as a nidus or a point of *Sthānasraṃśṛaya* for the *Dōṣa*. In other perspective the *Dōṣas* from *Kōṣṭa* have travelled to *Śākha*. The disease may have this *Saṃprāpti* in constipated patients.

Among 20 participants, 72.5% participants were having the disease for a duration less than 6 months (acute), 27.5% were having a duration between 6-12 months (chronic), and none of them were having the symptoms continuously for greater than 12 months. Therefore, majority of participants experienced the condition as an acute disease, whereas a small fraction of participants felt it as a chronic one. After the study we found that the *Jalaukāvacaraṇa* is having more effect in acute cases (duration within 6 months). The involvement of *Rakta* and *Vāta* is clear here. Chronic plantar fasciitis (over one year) can become plantar fasciosis due to avascular scarring of the plantar fascia. It is painful due to poor blood supply to the scarred tissues and is resistant to treatment that reduces inflammation for plantar fasciitis.[15]

The medial rear foot X-rays revealed heel spurs on 30% of participants in our study, but the appearance of spurs is not always seen in plantar fasciitis and heel spurs are not considered to be the cause of the pain in plantar fasciitis. In fact, they are often seen on X-rays of people who do not have heel pain or plantar fasciitis and are therefore believed to be an incidental finding. Chi-square test was performed to find out the association in our study. It was found to be insignificant at $p>0.05$ for all variables. Thus, the data support the literature.

As explained in the classics, *Jalaukāvacaraṇa* relieves *Paittika* diseases especially *Vraṇaśōpha*. So, the *Vraṇaśōpha* in plantar fascia got relieved with *Jalaukāvacaraṇa*. The anti-inflammatory substances present in leech's saliva such as antistasin, hirustasin, piguamerin, bdellins etc. help to relieve the *Vraṇaśōpha* and thus alleviates all the inflammatory signs and symptoms in the plantar fascia. Anti-inflammatory substances reduce pain, tenderness and swelling in the foot. *Pitta Anubhanda* symptoms as well as *Rakta Anubhanda* symptoms got relieved with it. The enzyme Hyaluronidase present in leech's saliva made a significant reduction in the point of tenderness when get injected to the exact point.

Acetylcholine and histamine like molecules help to increase the blood flow to the local area of leech bite. These vasodilators in turn wash out all the inflammatory substances present in that area and improves the circulation which gradually helps in healing of the tissue. So here *Jalaukāvacaraṇa* helps to heal the micro tears in the plantar fascia caused by the cumulative micro trauma by increasing the blood flow. The same enzymes may also help to improve all the movements of that area by virtue of increased blood flow. Hence the symptoms, viz. stiffness and pain at sole of foot on passive dorsiflexion (windlass mechanism) also got improved with *Jalaukāvacaraṇa*. In a span of 30-45 minutes the *Jalauka* extracted around 10-15 ml of blood from the participants. The bite marks (purpuric papules) lasted for about 2- 3 weeks in the participants. Bleeding lasted for about 5-10 hours on average.

On analysing allopathic management, numerous interventions have been described for the treatment of plantar fasciitis, which include: rest, heat, ice pack, non-steroidal anti-inflammatory drugs (NSAIDs), heel pads, magnetic insole, night splints, walking cast, taping, plantar and Achilles stretching, ultrasound, steroid injection, extra-corporeal shock wave therapy, platelet-rich plasma injection, pulsed radiofrequency electro-

magnetic field therapy, and surgery. The most commonly used interventions are NSAIDs and local injection of steroids. Reported complications of palpation-guided steroid injection are plantar fascia rupture, fat pad atrophy, lateral plantar nerve injury secondary to injection, and calcaneal osteomyelitis.[16] Comparing with steroid injections, *Jalaukāvacaraṇa* has better efficacy due to the anti-inflammatory, analgesics, vasodilatory enzymes in leech's saliva. Moreover, no complications were noted during or after the procedure. Local injection of PRP (platelet-rich plasma injection) provides significant relief of pain and improvement of function, and the results are sometimes superior to local steroid injection. They unlike steroids, stimulates the reparative process.[17] *Jalaukāvacaraṇa* also helps in healing the micro tears of plantar fascia. So, in total the results of multiple interventions (NSAIDS, local steroid injections, platelet-rich plasma injection) under modern medicine are obtained merely with a simple procedure of *Jalaukāvacaraṇa*.

CONCLUSION

- *Jalaukāvacaraṇa* is having more efficacy in acute cases (duration within 6 months), as *Raktaviśrāvaṇa* is indicated as the treatment for recent inflammations. So, the recent inflammatory changes in the plantar fascia can be effectively managed with the *Jalaukāvacaraṇa*.
- *Jalaukāvacaraṇa* shows 67.85 % of efficacy in the management of plantar fasciitis.

REFERENCES

1. Richard S. Snell. Clinical anatomy By Regions; 9th edition; published by Wolters Kluwer Pvt limited; New Delhi; 2013.chapter 10; p.491
2. WHO? Essential medicines and health products, Traditional medicine definitions (internet) available from www.int/medicines/areas/traditional/definitions. 2008-12-01.
3. Hossain M, Makawana N. "Not Plantar Fasciitis": The differential diagnosis and management of heel pain syndrome. Orthopaedics and Trauma. 2011;25(3):198–201.
4. Sharma P. V. *Suśŗuta Saṃhita* (with English translation and ḍalhaṇa commentary): Varanasi: Chaukhamba visvabharati; 2004; volume 2: p.304-305.1/9 (Haridas Āyurvēda series).
5. *Bhāratīya vaidyaśāstratinte maulīka siddhantaṅgal;* Prof. P.V. Devasya; printed at little flower press; third edition;1996: p 5
6. *Sushruta, Suśŗuta Saṃhita.* Edited by G.D Singhal et al.published by Chaukambha Sanskrit pratishthan, delhi;second edition;2007; *sutrasthana;*22/3: p 202.
7. Nishanath P. P. An open clinical trial of *kūmullu vēru kaṣayaṃ* on its analgesic efficacys wsrt plantar fasciitis. (MD dissertation). Department of *Dravyaguṇa vijñāna*. Vaidyaratnam P. S. Varier Āyurvēda College, Kottakkal; 2016.
8. *Sushruta, Suśŗuta Saṃhita*. Edited by G. D Singhal et al. published by Chaukambha Sanskrit pratishthan, delhi; second edition;2007; *sutrasthana;*13/17: p 111.
9. Clarke C.E.W. Medical therapeutics derived from leeches (Phy. Annelida; Cl. Hirudinea) MacEwan University Student eJournal. 2016; 3(1) Available from https://journals.macewan.ca/muse/article/view/297/818.
10. Sharma P. V. *Suśŗuta Saṃhita* (with English translation and *ḍalhaṇa* commentary): Varanasi: Chaukhamba visvabharati; 2004; volume 2: p.304-305.1/9 (Haridas *Āyurvēda* series).
11. Neufeld SK, Cerrato R. Plantar fasciitis: evaluation and treatment. J Am Acad Orthop Surg2008; 16:338–346.
12. Christopher W Reb, Faith A Schick, Homyar N Karanjia, Joseph N Danieletal. High prevalence of obesity and female gender among the patients with concomitant Tibialis posterior tendonitis and plantar fascitis. Jefferson Digital commons, Rothman institute. (internet) 2015; cited (2015/12/14) available from http://jdc.jefferson.edu/rothman institute/63.
13. Riddle DL, Schappert SM. Volume of ambulatory care visits and patterns of care for patients diagnosed with plantar fasciitis: a national study of medical doctors. Foot Ankle Int2004;25:303–310 <https://www.ncbi.nlm.nih.gov/pubmed/15134610/> accessed 6 June 2019. https://www.bc-legal.co.uk/bcdn/897-276-occupational-plantar-fasciitis-claims-deconstructed
14. Irving DB, Cook JL, Young MA, Menz HB. Obesity and pronated foot type may increase the risk of chronic plantar heel pain: a matched case-control study. *BMC Musculoskel Disord*. 2007; 8(1):41.

15. Irving DB, Cook JL, Menz HB. Factors associated with chronic plantar heel pain: a systematic review. J Sci Med Sport. 2006; 9:11–22. [PubMed]
16. Acevedo JI, Beskin JL. Complications of plantar fascia rupture associated with corticosteroid injection. Foot Ankle Int. 1998; 19:91–7. [PubMed]
17. Peerbooms JC, van Laar W, Faber F, Schuller HM, van der Hoeven H, Gosens T. Use of platelet rich plasma to treat plantar fasciitis: design of a multi-centre randomized controlled trial. BMC MusculoskeletDisord. 2010;11:69. [PMCfreearticle] [PubMed]

Source of Support: Nil
Conflict of Interest: None Declared

How to cite this URL: Veena K Nambiar & George M.J: Jalaukāvacaraṇa In Plantar Fasciitis. International Ayurvedic Medical Journal {online} 2020 {cited October, 2020} Available from: http://www.iamj.in/posts/images/upload/4724_4731.pdf