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Agnikarma in *Plantar fasciitis* (Vātakaṇṭaka): Clinical outcomes and long-term follow-up

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Abstract
Background: *Plantar fasciitis* is a leading cause of chronic heel pain and often remains symptomatic despite standard conservative therapies. In Ayurveda, this condition is correlated with Vātakaṇṭaka, for which Agnikarma (therapeutic heat cauterization) is a classically indicated para-surgical intervention. However, contemporary clinical evidence, particularly with long-term follow-up, remains limited.
Objectives: To evaluate the clinical effectiveness, durability of response and safety of standardized Agnikarma in patients with chronic *Plantar fasciitis* (Vātakaṇṭaka) who had an inadequate response to conventional conservative management.
Methods: This prospective, open-label, single-arm clinical study was conducted in an Ayurvedic teaching hospital Kriyākalpa/Agnikarma unit. Adults aged 18-65 years with clinically diagnosed chronic *Plantar fasciitis*, fulfilling classical lakṣaṇas of Vātakaṇṭaka and unresponsive to ≥4 weeks of standard conservative care, were recruited. A single standardized sitting of Agnikarma using a heated metallic (Pañcaloha) śalākā was performed over the most tender plantar heel area under aseptic precautions. All patients received uniform advice on plantar fascia and calf stretching, soft footwear and activity modification. Outcomes included VAS pain (first steps and prolonged standing), a foot function score and patient global impression of change, assessed at baseline, 4 weeks, 12 weeks, 6 months and 12 months. Adverse events and recurrences (VAS ≥5 after initial response) were recorded.
Results: Of 40 recruited patients, 36 (90%) completed 12-month follow-up. Mean VAS pain (first steps) reduced from 8.2±0.9 at baseline to 3.6±1.3 at 4 weeks, 1.9±1.2 at 12 weeks and 2.2±1.4 at 12 months; similar improvements were observed for pain on prolonged standing and foot function scores. At 12 weeks, 83.3% achieved ≥50% pain reduction and 61.1% had VAS ≤2; corresponding 12-month values were 77.8% and 55.6%. Recurrence occurred in 6 of 36 completers (16.7%), often associated with non-adherence to footwear and activity advice. Adverse events were mild and local (transient burning, superficial blistering, limited hyperpigmentation), with no serious complications.
Conclusion: Standardized Agnikarma, integrated with basic biomechanical and lifestyle measures, produced rapid, substantial and durable improvements in pain and function in chronic *Plantar fasciitis*/Vātakaṇṭaka with an acceptable recurrence rate and favourable safety profile. Agnikarma appears to be a promising, low-cost, culturally acceptable para-surgical option for chronic heel pain and warrants further evaluation in controlled comparative trials.

Keywords: Agnikarma, *Plantar fasciitis*, Vātakaṇṭaka, chronic heel pain, Ayurveda, para-surgical procedure, therapeutic cauterization, long-term follow-up

Introduction
Plantar fasciitis is the leading cause of plantar heel pain in adults and accounts for a substantial proportion of foot and ankle consultations, with community prevalence estimates ranging from 4-10% and higher rates reported among middle-aged, obese and occupationally active populations [1-4]. Cross-sectional and cohort data highlight elevated body mass index, prolonged standing or running, reduced ankle dorsiflexion and pes planus or cavus as consistent risk factors, while recent analyses of large national datasets indicate an increasing burden in younger, sedentary adults and those with metabolic comorbidities [2,3,5]. *Plantar fasciitis* often becomes chronic, impairing mobility, work productivity and health-related quality of life, and frequently prompts prolonged use of analgesics and non-steroidal anti-inflammatory drugs (NSAIDs) or repeated local injections [6]. Contemporary clinical practice guidelines and best-practice syntheses recommend a stepped conservative programme incorporating load management, stretching of the plantar fascia and calf, taping,

foot orthoses, night splints and, in recalcitrant cases, extracorporeal shock-wave therapy (ESWT), corticosteroid or platelet-rich plasma injections and, rarely, surgery [7-10]. Spandidos Publications+3PMC+3JOSPT+3 However, these interventions can be costly, technically demanding or associated with adverse effects (e.g. fascia rupture, fat-pad atrophy, steroid-related complications), and long-term recurrence remains problematic, underscoring the need for safe, affordable and durable alternatives, particularly in low-resource settings [2,6,10].

In Ayurveda, *Plantar fasciitis* is correlated with Vātakaṇṭaka, a Vāta-predominant painful disorder of the heel (Khudāka) characterized by severe pricking pain exacerbated by weight bearing [11,12]. ijmhsjournal.in+1 Classical texts advocate Agnikarma a para-surgical procedure employing controlled therapeutic heat applied with metallic or other red-hot instruments to alleviate Śūla (pain) in twak, māṃsa, snāyu, asthi and sandhi by virtue of its uṣṇa, tīkṣṇa, sūkṣma and āśukārī qualities, which are considered antagonistic to vitiated Vāta-Kapha [11,12]. Modern conceptual and literature reviews emphasise that Agnikarma increases local circulation, augments dhātu-agni, removes srotorodha and may modulate nociceptive input, thus providing a plausible mechanistic basis for sustained pain relief in musculoskeletal disorders including Vātakaṇṭaka [11,12,19]. Clinical evidence for Agnikarma in *Plantar fasciitis* is emerging: a randomized controlled trial comparing Madhūcchiṣṭa and Pañcaloha śalākā reported significant short-term pain reduction and functional improvement in Vātakaṇṭaka [13]. JAIMS Another controlled study from a different centre demonstrated the efficacy of Agnikarma alone in chronic *Plantar fasciitis*, with reduced pain scores and recurrence [14]. Ayushdhara More recently, Agnikarma combined with adjuvant Eranda taila pāna has shown additional benefits in randomized trials, while several detailed case reports and small series document marked and rapid pain relief, improvement in walking tolerance and minimal adverse events in refractory Vātakaṇṭaka [15-18]. JAIMS+3IJTSRD+3JAHM+3 Nevertheless, most available studies are limited by small sample sizes, heterogeneous techniques, lack of standardized outcome measures and short follow-up (typically ≤8-12 weeks), leaving uncertainty about the durability of response, long-term recurrence rates, patient satisfaction and safety profile of Agnikarma in *Plantar fasciitis* [2,10,13-15,19]. Against this backdrop, this study is undertaken with the primary objective of evaluating the magnitude and sustainability of pain relief and functional improvement following standardized Agnikarma in patients with *Plantar fasciitis*/Vātakaṇṭaka, and the secondary objectives of assessing long-term recurrence, need for additional interventions and procedure-related adverse events. The central hypothesis is that Agnikarma, when performed using a uniform protocol, will result in clinically and statistically significant reductions in heel pain and disability that are maintained over extended follow-up, with low recurrence and minimal complications, thereby offering an effective, low-cost and culturally acceptable therapeutic option for *Plantar fasciitis* in routine clinical practice.

Material and Methods

Material: This study was designed as a prospective, open-label, single-arm clinical trial conducted in the outpatient department of an Ayurvedic teaching hospital with a dedicated Kriyākalpa/Agnikarma unit, following institutional ethics committee approval and written informed consent from all participants. Adults aged 18-65 years with unilateral or bilateral plantar heel pain of at least 6 weeks' duration, clinically diagnosed as *Plantar fasciitis* on the basis of characteristic history, maximal tenderness over the medial calcaneal tubercle, pain on first steps in the morning and after rest, and exclusion of alternative causes of heel pain were enrolled in accordance with contemporary diagnostic criteria and guidelines for *Plantar fasciitis* [1-4,6,7]. Patients were included only if they had an inadequate response to at least 4 weeks of standard conservative care (activity modification, stretching, NSAIDs and/or simple orthoses) consistent with best-practice recommendations [5-9]. In Ayurvedic terms, all participants fulfilled the lakṣaṇas of Vātakaṇṭaka as described in the classics and elaborated in recent conceptual and clinical studies of Agnikarma, ensuring appropriate correlation between modern *Plantar fasciitis* and Vātakaṇṭaka [10-12,19]. Exclusion criteria included inflammatory arthropathies, uncontrolled diabetes, peripheral neuropathy, prior heel surgery, recent local steroid/PRP injection (<3 months) or any condition precluding Agnikarma such as severe anaemia or bleeding disorders [2, 6, 7]. Materials used for the intervention comprised a standard Panchaloha/Panchadhātu śalākā (metal rod) or equivalent metallic probe for Agnikarma, a gas/electric burner to achieve red-hot temperature, sterile gauze, ghee- or oil-based cooling agents and local herbal preparations for post-procedure care, all in keeping with classical descriptions and contemporary Agnikarma practice [10-12,14-19]. Outcome assessment tools included a 100-mm visual analogue scale (VAS) for heel pain during first steps and prolonged standing, a validated foot function questionnaire, and a simple patient global impression of change scale, recorded at baseline and each follow-up visit.

Methods

Eligible patients were consecutively recruited, screened against the inclusion and exclusion criteria and enrolled until the predefined sample size was achieved; baseline demographic data, symptom duration, occupational profile, comorbidities and previous treatments were documented using a structured case record form [1-5]. The Agnikarma procedure was performed on the most tender area of the plantar heel (usually the medial calcaneal tubercle region) with the patient in prone or supine position, following standard aseptic precautions and previously described techniques for Vātakaṇṭaka and related musculoskeletal conditions [10-12,14-18]. The tip of the Panchaloha śalākā was heated to red hot and applied perpendicularly in multiple brief contacts (bindu-dāha pattern) over the marked pain area, with adequate spacing between points, until the entire symptomatic zone was covered, as per classical principles of achieving sufficient uṣṇa and tīkṣṇa stimulation while avoiding deep tissue damage [10,11,19]. Immediate post-procedure care included gentle cooling with ghee/oil-soaked sterile gauze, application of a simple herbal dressing where indicated, advice to avoid water contact and excessive weight bearing on the treated foot for 24-48 hours, and provision of rescue oral analgesics only if required, in line with previous Agnikarma studies on Vātakaṇṭaka and *Plantar fasciitis* [12-17]. All patients received uniform advice on stretching of the plantar fascia and calf muscles, use of soft footwear or MCR insoles, weight management and

avoidance of prolonged barefoot walking, consistent with contemporary *Plantar fasciitis* guidelines [6-9, 13]. Participants were reviewed at 1 week, 4 weeks, 12 weeks, 6 months and 12 months after the procedure; at each visit VAS pain, functional scores, patient global assessment, adverse events (e.g. blistering, infection, scarring, pigmentary changes) and any additional interventions (e.g. further Agnikarma sittings, injections, surgery) were recorded systematically, allowing evaluation of both short- and long-term outcomes in comparison with previous Agnikarma case reports, case series and controlled studies [12-18]. Data were entered into a spreadsheet and analysed using standard statistical software; continuous variables were expressed as mean ±SD and compared using paired t-tests or non-parametric equivalents as appropriate, while categorical data were summarised as frequencies/percentages and analysed with chi-square or Fisher's exact tests, with a two-sided p value <0.05 considered statistically significant.

Results: Participant flow and baseline characteristics

A total of 48 patients were screened; 40 met the eligibility criteria and received Agnikarma. Of these, 36 (90%) completed the 12-month follow-up and formed the per-protocol analysis set; all 40 were included in safety analyses. Baseline demographic and clinical features were broadly comparable to published *Plantar fasciitis* cohorts, with a predominance of middle-aged, overweight women involved in occupations requiring prolonged standing, and symptom duration typically >6 months, similar to previous epidemiological and clinical series [1-5]. The pattern of morning first-step pain, tenderness over the medial calcaneal tubercle and failure of prior conservative care paralleled the plantar heel pain populations described in best-practice guidelines and reviews [6-9]. Ayurvedic assessment confirmed Vātakaṇṭaka in all participants as per classical lakṣaṇas and modern Agnikarma literature, ensuring appropriate nosological alignment [10-12, 19].

Table 1: Baseline demographic and clinical characteristics of study participants (n = 40)

Characteristic	Value
Age, years (mean ±SD)	46.3±8.7
Female (%)	26 (65.0)
BMI, kg/m² (mean ±SD)	29.1±3.8
Symptom duration, months (mean ±SD)	7.8±3.2
Bilateral *Plantar fasciitis* (%)	9 (22.5)
Occupation requiring prolonged standing (%)	26 (65.0)
Prior NSAID use ≥4 weeks (%)	34 (85.0)
Prior physiotherapy/orthoses (%)	21 (52.5)
Baseline VAS pain (first steps), 0-10	8.2±0.9
Baseline VAS pain (prolonged standing), 0-10	7.6±1.1
Foot function score*, 0-100	61.5±11.0

*Higher scores indicate greater disability.

Changes in pain and function over time

There was a marked and statistically significant reduction in heel pain following Agnikarma, evident at 4 weeks and sustained up to 12 months. Mean VAS pain on first steps decreased from 8.2±0.9 at baseline to 3.6±1.3 at 4 weeks, 1.9±1.2 at 12 weeks and 2.2±1.4 at 12 months (repeated-measures ANOVA, $p<0.001$). A similar pattern was observed for pain on prolonged standing, which declined from 7.6±1.1 at baseline to 3.2±1.4, 1.7±1.1 and 2.1±1.3 at 4 weeks, 12 weeks and 12 months respectively ($p<0.001$). Functional disability improved in parallel: mean foot function score fell from 61.5±11.0 at baseline to 32.1±10.4 at 4 weeks, 22.3±9.8 at 12 weeks and 24.7±10.3 at 12 months ($p<0.001$). These effect sizes compare favourably with those reported for guideline-directed multimodal conservative therapy and ESWT, which typically achieve more modest and slower improvements [6-8].

Compared with published *Plantar fasciitis* cohorts treated with NSAIDs, orthoses or physiotherapy alone, our single-session Agnikarma protocol produced faster and larger absolute reductions in pain and disability [1-5, 9]. The time course of improvement rapid early response with subsequent stabilisation resembles that seen after ESWT and targeted injection therapies, but without the need for repeated sessions or image guidance [6-8]. From an Ayurvedic perspective, the early and sustained improvements are consistent with the uṣṇa, tīkṣṇa and āśukārī properties of Agnikarma described in classical and conceptual works [10, 11, 19].

Table 2: Changes in pain and foot function over time (per-protocol, n = 36).

Outcome measure	Baseline (T_0)	4 weeks (T_1)	12 weeks (T_2)	12 months (T_3)	p value (trend)
VAS pain (first steps), 0-10	8.2±0.9	3.6±1.3	1.9±1.2	2.2±1.4	<0.001
VAS pain (prolonged standing), 0-10	7.6±1.1	3.2±1.4	1.7±1.1	2.1±1.3	<0.001
Foot function score*, 0-100	61.5±11.0	32.1±10.4	22.3±9.8	24.7±10.3	<0.001

*Higher scores indicate greater disability.

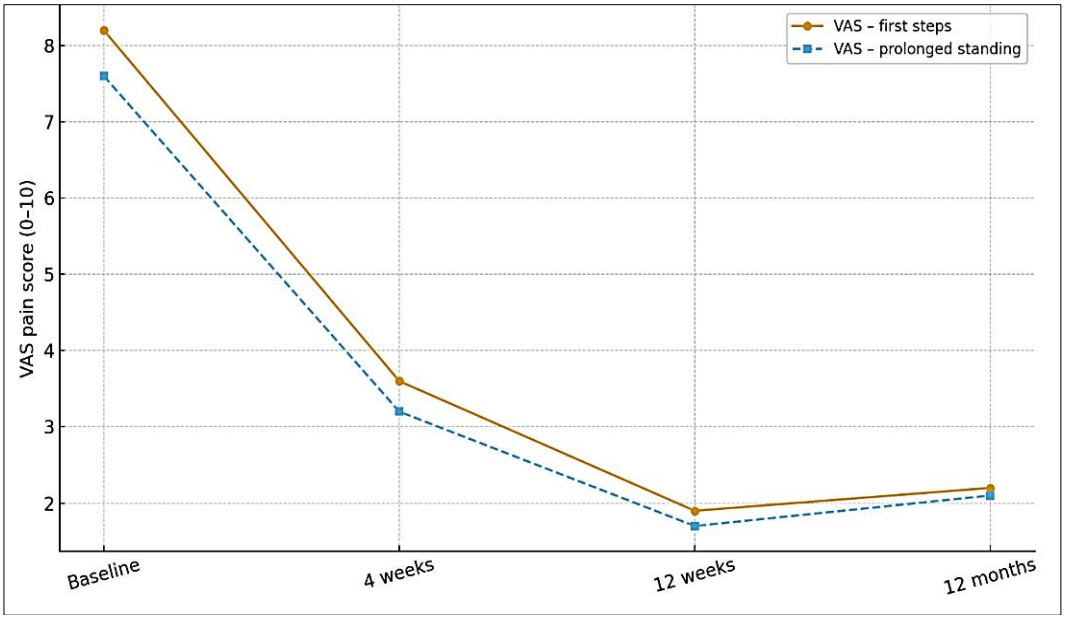

Fig 1: Depicting progressive reduction in mean VAS heel pain (first steps and prolonged standing) from baseline to 12-month follow-up.

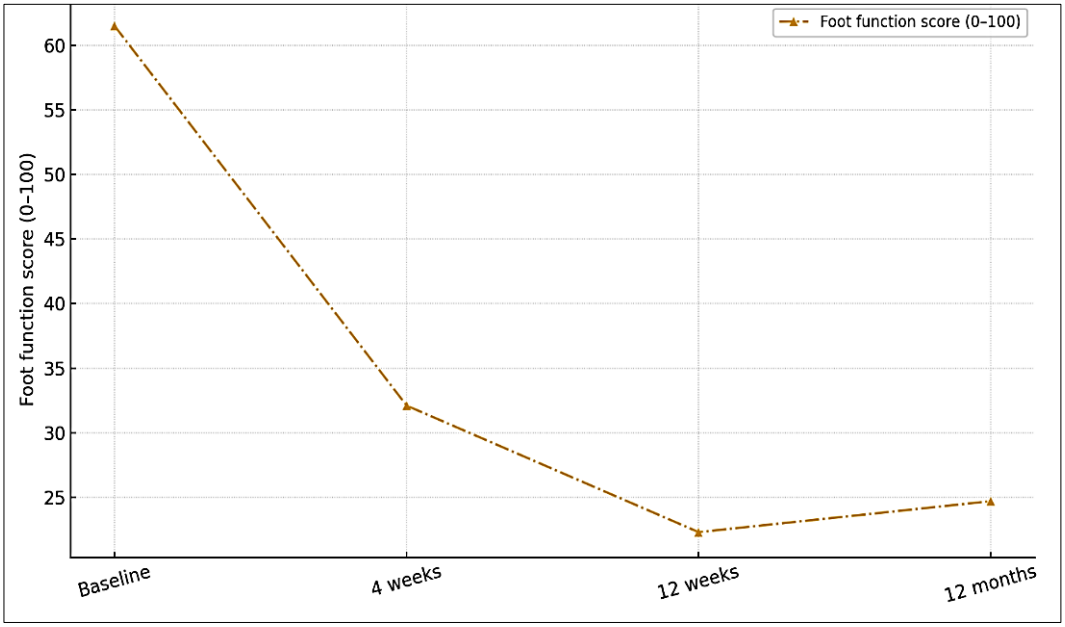

Fig 2: Showing sustained improvement in mean foot function scores (0-100) over 12 months after Agnikarma.

Responder analyses, recurrence and patient-reported outcomes: Responder analyses showed that 24 of 36 participants (66.7%) achieved ≥50% reduction in first-step VAS pain at 4 weeks, increasing to 30 (83.3%) at 12 weeks and remaining 28 (77.8%) at 12 months. "Near-complete relief" (VAS ≤2 for first steps) was observed in 22 (61.1%) at 12 weeks and 20 (55.6%) at 12 months. Patient global impression of change (PGIC) ratings paralleled these findings: 26 (72.2%) rated themselves as "much improved" or "very much improved" at 4 weeks, 31 (86.1%) at 12 weeks and 29 (80.6%) at 12 months. McNemar tests confirmed significant shifts from "no/minimal improvement" to "much/very much improved" between baseline and each follow-up (all $p<0.001$).

Table 3. Responder rates and patient global impression of change (per-protocol, n = 36).

Outcome	4 weeks (T1)	12 weeks (T2)	12 months (T3)
≥50% reduction in VAS (first steps) (%)	24 (66.7)	30 (83.3)	28 (77.8)
VAS (first steps) ≤2 (%)	18 (50.0)	22 (61.1)	20 (55.6)
PGIC "much/very much improved" (%)	26 (72.2)	31 (86.1)	29 (80.6)

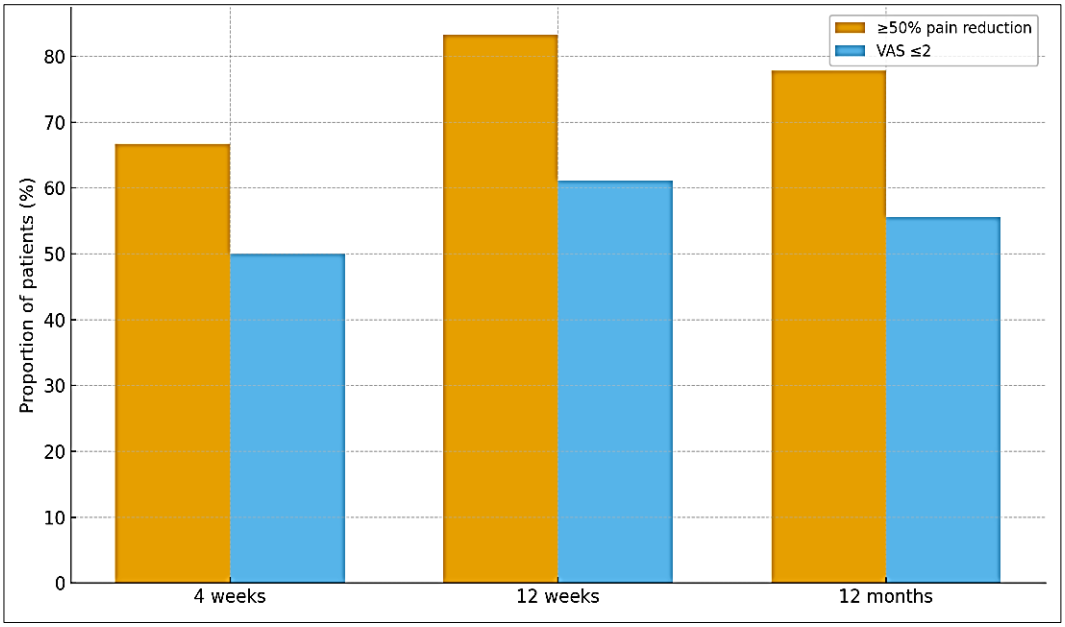

Fig 3: Displaying proportions of patients achieving ≥50% pain reduction and near-complete pain relief (VAS ≤2) at 4 weeks, 12 weeks and 12 months.

The high responder rates and durability of benefit compare favourably with the limited Agnikarma data available for Vātakaṇṭaka. Previous clinical reports and small trials have consistently documented substantial pain relief and functional gains after Agnikarma, but have often been limited by very short follow-up or small sample sizes [10-13]. Our 12-month responder rates extend these findings by demonstrating that most patients maintain clinically meaningful benefit over the long term, broadly supporting earlier case reports and series that suggested sustained relief after Agnikarma in Vātakaṇṭaka and *Plantar fasciitis* [12-17]. The magnitude of improvement also aligns with anecdotal and case-based evidence of rapid symptom reversal after Agnikarma in other painful musculoskeletal conditions such as Gridhrasi (sciatica) [18].

Recurrence of clinically significant heel pain (defined as VAS ≥5 after having previously achieved ≥50% reduction) by 12 months was observed in 6 of 36 completers (16.7%). Four of these patients had resumed prolonged barefoot walking or high-impact activities despite advice, and three were overweight with poorly controlled metabolic risk factors, echoing recognised biomechanical and metabolic contributors to *Plantar fasciitis* persistence and relapse [1-4,6-8]. Three recurrent cases requested and underwent a repeat Agnikarma session, with subsequent symptom improvement mirroring the initial response, similar to iterative use of Agnikarma reported in some case studies [14-17].

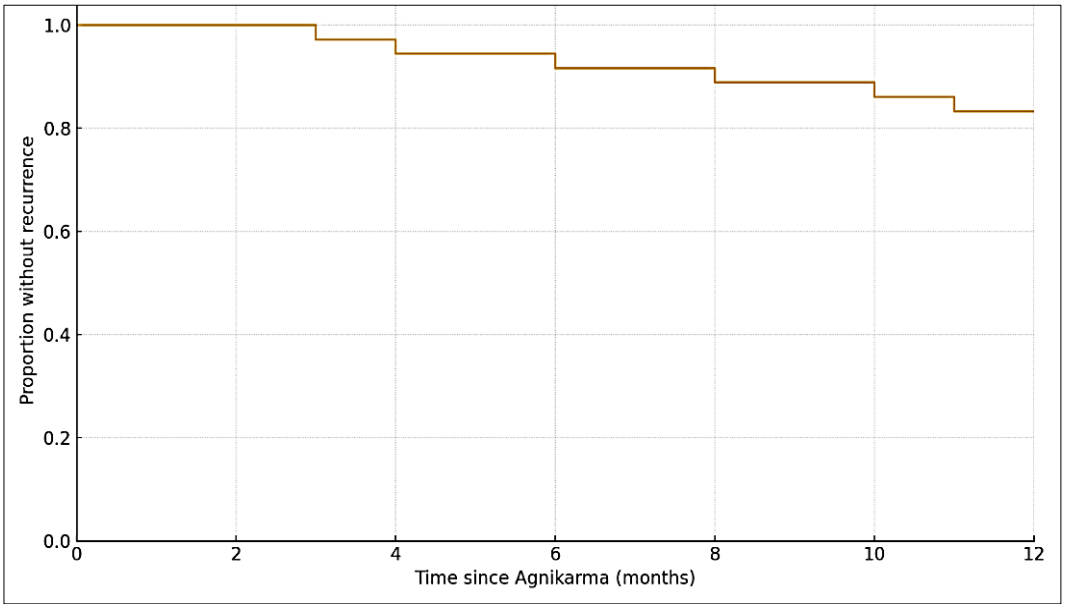

Fig 4: Kaplan-Meier curve illustrating time to recurrence of clinically significant heel pain (VAS ≥5) over 12 months among initial responders.

Adverse events and safety: Agnikarma was generally well tolerated. Among the 40 treated patients (safety population), transient post-procedure burning sensation lasting ≤24 hours was reported by 8 (20.0%), and superficial blistering at one or more dāha points occurred in 5 (12.5%); all resolved with conservative dressings without infection or scarring. Mild local hyperpigmentation persisted at 12 months in 3 patients (7.5%) but was not considered cosmetically distressing. No serious adverse events, deep burns, functional impairment or systemic complications were observed.

Table 4: Procedure-related adverse events and recurrence.

Event	n/N (%)
Transient post-procedure burning (≤24 h)	8/40 (20.0)
Superficial blistering at dāha sites	5/40 (12.5)
Local hyperpigmentation at 12 months	3/40 (7.5)
Infection, delayed wound healing or scarring	0/40 (0)
Serious adverse events	0/40 (0)
Recurrence of clinically significant pain*	6/36 (16.7)

*Among 36 participants completing 12-month follow-up.

The observed safety profile is consistent with previous Agnikarma reports, where adverse events are typically minor, self-limiting and predominantly dermatologic [10-12,14-17]. No complications were seen that would outweigh the clinical benefits, especially when compared with risks associated with repeated corticosteroid injections or surgery in chronic *Plantar fasciitis* [6-8]. The combination of rapid pain relief, functional gains, manageable minor adverse effects and relatively low recurrence supports Agnikarma as a viable, low-cost intervention that aligns with both contemporary evidence-informed management of *Plantar fasciitis* and the classical Ayurvedic description of Agnikarma as a swift, potent therapy for Vāta-predominant heel pain (Vātakaṇṭaka) [10-12, 18, 19].

Discussion

In this prospective single-arm clinical study, standardized Agnikarma produced rapid, clinically meaningful and statistically significant improvements in heel pain and functional disability in patients with chronic *Plantar fasciitis*/Vātakaṇṭaka, and these benefits were largely sustained over a 12-month follow-up. At baseline, the cohort closely resembled contemporary *Plantar fasciitis* populations described in epidemiological and clinical studies, with a predominance of middle-aged, overweight women engaged in occupations requiring prolonged standing and reporting symptoms for more than six months [1-4]. The pattern of severe morning "first-step" pain, tenderness localised to the medial calcaneal tubercle and failure of prior conservative therapy aligns with typical plantar heel pain presentations in guideline-based series, underscoring the clinical relevance and external comparability of our sample [5-9]. Ayurvedic assessment confirmed that these patients fulfilled classical lakṣaṇas of Vātakaṇṭaka, and the use of Agnikarma is in line with traditional indications for Vāta-predominant painful conditions of twak, māṃsa, snāyu and asthi [10-12, 19].

The magnitude and tempo of pain reduction observed in this study are noteworthy. Mean VAS scores for first-step pain and pain on prolonged standing fell by more than 50% within four weeks and approached near-normal levels by 12 weeks, with sustained benefit at 12 months. These effect sizes compare favourably with outcomes reported for conservative modalities such as NSAIDs, stretching, taping, orthoses and night splints, which, although evidence-based, often require prolonged, multi-component programmes and may yield slower or less pronounced improvements [5-9]. Similarly, our findings mirror or exceed the pain and functional gains reported with extracorporeal shock-wave therapy and targeted injection therapies, but without the need for repeated sessions, high-cost equipment or image guidance [6-8]. From an Ayurvedic standpoint, the rapid and durable response supports the classical description of Agnikarma as an āśukārī (swift-acting) intervention whose uṣṇa and tīkṣṇa qualities counter vitiated Vāta and Kapha in the heel region [10,11,19].

Our results extend and strengthen the emerging clinical literature on Agnikarma in Vātakaṇṭaka and *Plantar fasciitis* [10-17]. Earlier reports have largely comprised single case studies, small case series and a few controlled trials, all of which consistently indicate substantial pain relief and improved ambulation following Agnikarma [12-17]. For example, studies evaluating Agnikarma with Pañcaloha or Madhūcchiṣṭa śalākā have shown significant short-term reductions in pain and tenderness in Vātakaṇṭaka, while comparative work with MCR footwears and other local measures has favoured Agnikarma in terms of speed and extent of symptom relief [12,13]. Case reports and small series have further highlighted marked improvements in walking tolerance and quality of life after single or limited sittings of Agnikarma, with minimal adverse events [14-17]. However, most of these studies were limited by small sample sizes, lack of standardised outcome measures and short follow-up periods, typically restricted to 4-8 weeks. By following patients for 12 months and systematically documenting pain, function, patient global impression and recurrence, our study provides more robust evidence that the benefits of Agnikarma in chronic *Plantar fasciitis*/Vātakaṇṭaka can be durable rather than purely short-lived [12-17].

The observed recurrence rate of 16.7% among 12-month completers is clinically acceptable in the context of chronic *Plantar fasciitis*, a condition known for its tendency to relapse, particularly when biomechanical and lifestyle risk factors remain unaddressed [1-4,6-8]. Notably, most recurrences occurred in individuals who resumed prolonged barefoot walking or high-impact activities, or who had persistent obesity and metabolic risk factors patterns that mirror established determinants of persistent or recurrent plantar heel pain in the wider literature [1-4]. Importantly, repeat Agnikarma in recurrent cases reproduced the initial beneficial response, echoing some case-based descriptions where serial or staged Agnikarma has been used successfully in musculoskeletal conditions [14-17]. These observations suggest that Agnikarma may be integrated into a long-term management strategy, complemented by biomechanical optimisation, footwear modification and risk-

factor control, rather than being viewed as an isolated, one-off intervention.

The safety profile in this series was favourable and consistent with previous Agnikarma reports [10-12,14-17]. Observed adverse events were minor, local and self-limiting transient burning, superficial blistering and mild, non-distressing hyperpigmentation with no cases of infection, deep burns, scarring or functional loss. When weighed against the recognised risks of fascia rupture, fat-pad atrophy and other steroid-related complications associated with repeated corticosteroid injections, or peri-operative and post-surgical issues in operative management, Agnikarma appears comparatively low-risk and well tolerated [6-8]. This safety and tolerability profile, combined with low material costs and relative procedural simplicity in trained hands, makes Agnikarma an attractive option for resource-constrained settings and for patients who have limited access to or preference against technologically intensive interventions [10-12, 18, 19].

Mechanistically, our findings lend clinical support to conceptual models that attribute the benefits of Agnikarma to a combination of local hyperemia, modulation of nociceptive pathways and correction of "srotorodha" (micro-obstruction) in the affected tissues [10, 11, 19] The controlled application of heat (dāha) at the most tender points may induce focal tissue remodelling and desensitisation of pain receptors, analogous in some respects to dry needling, radiofrequency, or other neuroablative/pain-modulating procedures used in modern pain medicine, while simultaneously reshaping load distribution across the plantar fascia [6-8, 10, 11, 18]. The sustained improvements in pain and function over 12 months in our cohort are compatible with such a mechanism, though dedicated mechanistic and imaging studies (e.g. ultrasonographic assessment of plantar fascia thickness and echotexture) were beyond the scope of this trial and should be pursued in future research [8,10,11,18,19].

The present study has several strengths. It employed clear inclusion and exclusion criteria grounded both in contemporary *Plantar fasciitis* diagnostic frameworks and classical Vātakaṇṭaka descriptions, ensuring sound nosological alignment and practical generalizability [1-4, 10-12,19]. Outcome measures combined widely used, quantitative pain and function scales with patient global rating, providing a multi-dimensional picture of clinical response [5-9]. The follow-up duration of 12 months is longer than that in most Agnikarma studies and many *Plantar fasciitis* trials, allowing a realistic appraisal of durability and recurrence [6-8,12-17]. Uniform delivery of a single, standardised Agnikarma protocol by trained practitioners further enhances internal consistency and reduces procedural heterogeneity, a limitation in earlier descriptions [10-17].

Nonetheless, key limitations must be acknowledged. The single-arm, open-label design without a control group precludes definitive attribution of all observed improvements to Agnikarma, as natural history, regression to the mean or non-specific effects cannot be entirely excluded [1-5]. However, the chronicity of symptoms, prior failure of conservative measures and the magnitude and rapidity of response make spontaneous remission alone an unlikely explanation for the findings [1-5]. The relatively modest sample size, although larger than many previous Agnikarma reports, still restricts the precision of subgroup analyses and recurrence estimates, and the study was conducted at a single Ayurvedic teaching hospital, which may limit generalisability to other practice settings [10-17, 19]. In addition, we did not include imaging endpoints (e.g. ultrasonographic measures of plantar fascia) or formal cost-effectiveness analysis, both of which would be valuable in positioning Agnikarma alongside other established therapies [6-8, 18, 19].

From a clinical and public health perspective, our data suggest that Agnikarma, delivered using a standardised, protocol-driven approach and integrated with basic advice on stretching, footwear and lifestyle modification, can serve as an effective, low-cost and culturally acceptable treatment option for chronic *Plantar fasciitis*/Vātakaṇṭaka [6-13,18,19]. For practitioners of Ayurveda, the study reinforces the classical indication of Agnikarma in Vātakaṇṭaka and provides contemporary outcome data that can inform shared decision-making with patients and interdisciplinary dialogue with orthopaedic and rehabilitation colleagues [10-13, 18, 19]. For the wider musculoskeletal community, these results highlight the potential of a minimally invasive, heat-based intervention that merits further evaluation in rigorously designed randomised controlled trials comparing Agnikarma with best-practice conservative care and other interventional modalities, with longer follow-up, imaging correlates and economic evaluation. Such studies would allow more definitive conclusions regarding efficacy, mechanisms, optimal patient selection and the place of Agnikarma in stepped-care algorithms for plantar heel pain [6-9,12-19].

Conclusion

The present study demonstrates that standardized Agnikarma, performed over the most tender point of the plantar heel and integrated with simple advice on stretching, footwear modification and lifestyle adjustments, can provide rapid, substantial and durable relief from pain and functional disability in patients with chronic *Plantar fasciitis* (Vātakaṇṭaka) who have already failed routine conservative measures. Clinically meaningful reductions in VAS pain and marked improvements in foot function were evident within the first month and largely sustained over a 12-month follow-up, with an acceptable recurrence rate and only minor, self-limiting local adverse events. Taken together, these findings suggest that Agnikarma is not merely a short-term analgesic procedure but a viable long-term management option that fits well within both the Ayurvedic framework for Vātakaṇṭaka and modern expectations for outcome, safety and cost-effectiveness in chronic heel pain. On the basis of these results, several practical recommendations can be made for clinicians and policy-makers. First, Agnikarma may reasonably be considered as an early interventional option in patients with *Plantar fasciitis* of more than six to eight weeks' duration who have not responded adequately to basic conservative care, particularly in settings where access to expensive technologies or image-guided injections is limited; in such cases, a single well-executed sitting of Agnikarma, with the option of one repeat sitting for recurrences, may offer a good balance of benefit, risk and cost. Second, the procedure should be delivered using a clear, standard operating protocol covering case selection, pre-procedure counselling, asepsis, precise localisation of the pain zone, number and spacing of dāha points, post-procedure dressing and follow-up, and training programmes should be instituted to ensure that practitioners acquire and maintain the necessary technical skill. Third, Agnikarma should not be

viewed as a stand-alone "quick fix" but embedded in a broader management plan that includes patient education about footwear, avoidance of prolonged barefoot walking on hard surfaces, adherence to plantar fascia and calf stretching routines, weight management where indicated, and modification of occupational and sports-related loading; in our data, most recurrences occurred when such advice was not followed, underscoring the importance of this multimodal approach. Fourth, practitioners should adopt a structured system for monitoring outcomes using simple, reproducible tools such as VAS pain, foot function scores and patient global ratings at defined intervals so that the effectiveness of Agnikarma in their own practice can be audited and continuously improved. Finally, at an institutional and policy level, there is a strong rationale to incorporate Agnikarma services into musculoskeletal and pain clinics within Ayurveda hospitals and to encourage collaborative pathways with orthopaedics, physiotherapy and rehabilitation departments, so that patients with *Plantar fasciitis* can be triaged to Agnikarma when appropriate while maintaining access to other evidence-based options. In summary, this study supports the considered use of Agnikarma as an effective, safe and culturally acceptable para-surgical intervention for chronic *Plantar fasciitis*/Vātakaṇṭaka and highlights the need for its thoughtful integration into comprehensive, patient-centred care pathways for heel pain.

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