

**Review Article**

ISSN: 3048-5630

# **“MADHUMEHA VRANA (DIABETIC FOOT ULCER): CLASSICAL CONCEPTS AND THE EVIDENCE FOR AYURVEDIC WOUND CARE AS AN ADJUNCT TO STANDARD MANAGEMENT”**

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**FUNDING INFORMATION:**

Not Applicable

**How to cite this article:**

Tushar Tapadiya, “Madhumeha Vrana (diabetic foot ulcer): classical concepts and the evidence for Ayurvedic wound care as an adjunct to standard management” *Frontiers of Shalya and Shalakya Chikitsa*. 2026;3(1):16-20.  
Sri. 2026.1005.fssc.01.04

**ABSTRACT**

**Background:** Diabetic foot ulcers are a major cause of infection, amputation and death in people with diabetes, and India has one of the largest diabetic populations in the world. Classical Ayurvedic texts describe skin eruptions and wounds in Prameha (diabetes) and recognise their difficulty in healing. Ayurvedic wound care, including Panchavalkala washes, Jatyadi Taila, honey and leech therapy, is widely used for diabetic ulcers in India. **Objective:** To review the classical concepts relevant to diabetic foot ulcers, modern pathophysiology and evidence-based management, and the evidence for Ayurvedic wound care as an adjunct. **Methods:** Narrative review of Charaka and Sushruta Samhitas, international guidelines, systematic reviews and clinical trials. **Results:** Classical texts describe Prameha Pidaka, eruptions and abscesses in diabetes, and treat them with cleansing, healing and blood-purifying measures alongside control of Prameha. Modern management is based on offloading, debridement, infection control, revascularisation where needed, glycaemic control and education. A multicentric randomised trial found that cleansing with a Panchavalkala spray followed by Jatyadi Taila spray produced healing comparable to conventional antiseptic dressings in diabetic and varicose ulcers. Honey has unclear benefit in diabetic foot ulcers in a Cochrane review. Experimental studies support antimicrobial and pro-healing effects of Panchavalkala and Jatyadi Taila. **Conclusion:** Ayurvedic topical therapies may be reasonable adjuncts in diabetic foot ulcer care, but only within a framework that ensures offloading, infection management, vascular assessment and glycaemic control. Larger randomised trials with complete healing and amputation as outcomes are needed.

**KEYWORDS:** Madhumeha Vrana; diabetic foot ulcer; Prameha Pidaka; Panchavalkala; Jatyadi Taila; wound healing; amputation

## INTRODUCTION

Diabetic foot ulcers affect a substantial proportion of people with diabetes during their lifetime and are associated with high rates of recurrence, infection and amputation<sup>[1]</sup>. A systematic review estimated a global prevalence of diabetic foot ulceration of about 6% among people with diabetes<sup>[2]</sup>. Five-year mortality after diabetic foot ulceration and amputation has been shown to be comparable to that of many cancers, and the costs of care are very high<sup>[3]</sup>.

The main causes of diabetic foot ulcers are peripheral neuropathy, which causes loss of protective sensation, peripheral arterial disease and foot deformity, which together lead to unnoticed injury and impaired healing<sup>[1,4]</sup>. Infection can spread rapidly and lead to amputation.

India has one of the largest populations with diabetes in the world<sup>[5]</sup>, and many patients with foot ulcers seek Ayurvedic care, sometimes as their first point of contact. Ayurvedic wound care has a long tradition, and several formulations are widely used. This review summarises classical concepts, modern evidence-based management and the evidence for Ayurvedic wound care in diabetic foot ulcers, with the aim of supporting safe integration.

## METHODS

Classical sources were Charaka Samhita (Sutra Sthana 17, Chikitsa Sthana 6) and Sushruta Samhita (Nidana Sthana 6, Chikitsa Sthana 12)<sup>[6,7]</sup>. Modern literature was identified through PubMed, the Cochrane Library and Google Scholar using diabetic foot ulcer, IWGDF, offloading, honey, Panchavalkala, Jatyadi, leech therapy and Ayurveda. This is a narrative review.

## CLASSICAL CONCEPTS

### Prameha and its complications

Ayurveda describes Prameha as a group of urinary disorders, of which Madhumeha (sweet urine) corresponds to diabetes mellitus. Charaka and Sushruta describe several complications of Prameha, including Prameha Pidaka, eruptions and abscesses

that occur especially on vital points, joints and areas rich in muscle in patients with uncontrolled Prameha<sup>[6,7]</sup>. They classify these into several types, such as Sharavika, Kacchapika, Jalini, Vinata and others, according to their shape and character, and note that they are difficult to treat, especially in patients with severe disease.

### Wounds in Prameha

Classical texts recognise that wounds heal poorly in Prameha patients because of the vitiation of Kapha, Meda (fat tissue) and blood, impaired Agni and loss of Ojas. Sushruta classifies wounds in such patients as Dushta Vrana when they become chronic, infected and non-healing<sup>[7]</sup>. Treatment combines control of Prameha with local wound care.

### Classical management principles

- **Control of Prameha:** diet, exercise, herbs such as Nishamalaki (turmeric and Amla), Guduchi and Shilajatu, and purification where appropriate.
- **Local care:** cleansing (Shodhana) with astringent decoctions such as Panchavalkala and Triphala; drainage of pus; healing (Ropana) with honey, ghee and medicated oils.
- **Raktamokshana:** bloodletting, including leech therapy, for inflamed lesions.
- **Diet and lifestyle:** avoidance of heavy, sweet and oily foods; regular exercise; avoidance of daytime sleep.

## MODERN PATHOPHYSIOLOGY

Neuropathy causes loss of protective sensation, autonomic dysfunction with dry skin and fissures, and motor changes that alter foot shape and pressure distribution. Peripheral arterial disease reduces perfusion. Hyperglycaemia impairs immune function and wound healing at the cellular level, including impaired angiogenesis, collagen synthesis and response to growth factors<sup>[4]</sup>. Repetitive pressure on an insensate foot leads to callus, ulceration and infection.

## EVIDENCE-BASED MODERN MANAGEMENT

International guidelines on diabetes-related foot disease emphasise the following core elements<sup>[8]</sup>:

**Table 1: Elements of evidence-based modern management of diabetic foot ulcer**

| Element    | Key actions                                                                    |
|------------|--------------------------------------------------------------------------------|
| Prevention | Regular foot examination, risk stratification, education, appropriate footwear |

| Element                | Key actions                                                                                      |
|------------------------|--------------------------------------------------------------------------------------------------|
| Offloading             | Non-removable knee-high offloading devices (total contact cast or equivalent) for plantar ulcers |
| Debridement            | Regular sharp debridement of callus and non-viable tissue                                        |
| Infection              | Assessment of severity, culture-guided antibiotics, surgical drainage when needed                |
| Perfusion              | Vascular assessment and revascularisation when indicated                                         |
| Metabolic control      | Optimise blood glucose, blood pressure and lipids                                                |
| Dressings              | Choose dressings to manage exudate and moisture; few dressings have proven superiority           |
| Multidisciplinary care | Coordinated team including surgeon, podiatrist, physician and nurse                              |

These measures are essential regardless of any additional therapies used.

## EVIDENCE FOR AYURVEDIC WOUND CARE IN DIABETIC ULCERS

### Panchavalkala and Jatyadi Taila sprays

A randomised, controlled, open-label, multicentric trial in 53 patients with diabetic and varicose ulcers compared an Ayurvedic regimen with conventional care<sup>[9]</sup>. In the study group, ulcers were cleaned with a Panchavalkala Kwatha aerosol spray and then dressed with a Jatyadi Taila aerosol spray. In the control group, ulcers were cleaned with hydrogen peroxide or hypochlorite and dressed with 10% povidone iodine. Using the Bates-Jensen Ulcer Assessment Tool and photographic assessment, the authors reported that the Ayurvedic regimen had a healing effect comparable to conventional treatment and was comfortable and acceptable for patients.

This trial is notable because it used a standardised wound assessment tool and an active comparator in a multicentric setting. Its limitations include a small sample, open-label design, short follow-up and the inclusion of both diabetic and varicose ulcers.

### Experimental evidence for the formulations

Panchavalkala decoction showed antibacterial

activity against *Escherichia coli* and *Staphylococcus aureus* in a laboratory study<sup>[10]</sup>, supporting its traditional use for cleansing infected wounds. Jatyadi Taila improved wound strength and collagen deposition in normal and steroid-impaired healing in rats<sup>[11]</sup>, which is relevant because impaired collagen synthesis is a feature of diabetic wounds.

### Honey

A Cochrane review of honey for wounds found that its effects in diabetic foot ulcers compared with other treatments were unclear, based on two small trials<sup>[12]</sup>. Honey's antibacterial and moisture-retaining properties make it a reasonable dressing component, but it should not be regarded as a proven treatment for diabetic foot ulcers.

### Leech therapy

Leech therapy is used in Ayurveda for inflamed and congested lesions. In complicated varicose veins, leech application was associated with healing of ulcers<sup>[13]</sup>, but in diabetic foot disease, where arterial insufficiency and infection risk are common, leech therapy carries additional risks and should be used, if at all, only after vascular assessment and with strict infection precautions.

### Summary of evidence

**Table 2: Summary of evidence for Ayurvedic wound care in diabetic ulcers**

| Intervention                              | Evidence in diabetic ulcers                                              | Comment                              |
|-------------------------------------------|--------------------------------------------------------------------------|--------------------------------------|
| Panchavalkala spray + Jatyadi Taila spray | Multicentric RCT, comparable to povidone iodine dressings <sup>[9]</sup> | Small, open-label; mixed ulcer types |
| Panchavalkala decoction                   | In vitro antibacterial activity <sup>[10]</sup>                          | No clinical trial alone              |
| Jatyadi Taila                             | Rat wound studies <sup>[11]</sup> ; part of RCT regimen <sup>[9]</sup>   | Needs standalone trial               |
| Honey                                     | Cochrane: unclear in diabetic foot ulcers <sup>[12]</sup>                | Reasonable dressing option           |

| Intervention  | Evidence in diabetic ulcers                                  | Comment                            |
|---------------|--------------------------------------------------------------|------------------------------------|
| Leech therapy | No diabetic ulcer trials; venous ulcer study <sup>[13]</sup> | Risk in ischaemic or infected feet |

## INTEGRATING AYURVEDIC CARE SAFELY

The greatest risk of Ayurvedic treatment of diabetic foot ulcers is not the topical preparations themselves but the possibility that essential measures are delayed or omitted. Untreated infection, ischaemia or continued pressure can lead to amputation or death. A safe integrated approach should include:

1. **Immediate assessment of severity:** infection (spreading cellulitis, abscess, osteomyelitis, systemic signs), ischaemia (absent pulses, ankle-brachial index, toe pressures) and depth of ulcer.
2. **Urgent referral** for severe infection, gangrene, critical ischaemia or deep ulcers involving bone.
3. **Core management:** offloading, debridement, glycaemic control and antibiotics where indicated, delivered by or with a multidisciplinary diabetic foot team.
4. **Ayurvedic adjuncts:** Panchavalkala or Triphala washes, Jatyadi Taila or honey dressings, attention to diet, exercise and Agni, and Ayurvedic support for glycaemic control under medical supervision.
5. **Monitoring:** weekly wound measurement; if the ulcer area has not reduced by about half in four weeks, the plan should be reviewed, because the percentage area reduction at four weeks predicts complete healing at twelve weeks<sup>[14]</sup>.
6. **Prevention of recurrence:** footwear, foot care education and regular review after healing.

## ROLE OF AYURVEDIC PRACTITIONERS IN PREVENTION

Because many people with diabetes in India consult Ayurvedic practitioners, these practitioners are well placed to contribute to prevention. Simple measures can have large effects:

- **Annual foot examination:** inspection for calluses, deformity, fissures and nail problems; testing protective sensation with a 10 g monofilament; palpation of foot pulses.
- **Risk stratification:** identifying patients with loss of sensation, absent pulses, deformity or

previous ulcer as high risk, who need closer follow-up.

- **Education:** daily self-inspection of the feet, careful nail cutting, avoiding walking barefoot, wearing well-fitting footwear and seeking help at the first sign of injury.
- **Caution with heat and procedures:** avoiding hot fomentation (Sweda), hot water soaks, Agnikarma and strong caustics on insensate feet, where burns may go unnoticed.
- **Lifestyle support:** Ayurvedic dietary advice, exercise (Vyayama) adapted to foot risk, and stress reduction can support glycaemic control.

Classical Ayurvedic treatments such as Padabhyanga (foot oil massage) can help with dry skin and may be part of foot care, provided cracks are not massaged aggressively and hygiene is maintained.

## SAFETY

Topical Ayurvedic preparations may cause irritation or allergic reactions. Oil-based dressings may macerate surrounding skin if used in excess. Leech therapy and bloodletting carry risks of infection and bleeding, which are greater in people with diabetes. Herbal medicines for glycaemic control may interact with insulin and oral hypoglycaemic agents and cause hypoglycaemia; changes in diabetes treatment should be coordinated with the treating physician.

## RESEARCH PRIORITIES

1. Randomised trials of Ayurvedic topical regimens added to standard offloading and debridement, with complete healing at 12 or 20 weeks as the primary outcome.
2. Inclusion of amputation, infection and recurrence as secondary outcomes.
3. Blinded outcome assessment using standardised wound photography.
4. Separate analysis of diabetic and other ulcer types.
5. Studies of systemic Ayurvedic interventions for glycaemic control as adjuncts in patients with foot ulcers.

## DISCUSSION

Classical Ayurveda recognised that wounds in diabetic patients are difficult to heal and described a

comprehensive approach combining systemic control of Prameha with local wound care. Modern understanding of diabetic foot disease emphasises neuropathy, ischaemia, pressure and infection, which require specific interventions such as offloading and revascularisation that have no classical equivalent.

The available evidence suggests that Ayurvedic topical regimens may perform comparably to conventional antiseptic dressings, but the evidence is limited to a small number of trials. Importantly, comparable performance to povidone iodine does not establish benefit over modern moist wound care, and no trial has shown effects on amputation or major outcomes.

Ayurvedic practitioners have an important role in diabetes care in India, including early detection of foot problems, education and lifestyle support. This role can be strengthened by training in foot risk assessment and by clear referral pathways to diabetic foot services.

## CONCLUSION

Madhumeha Vrana, the diabetic foot ulcer, was recognised in classical Ayurveda as a difficult wound requiring systemic and local care. Ayurvedic topical therapies such as Panchavalkala and Jatyadi Taila have experimental support and comparable short-term results to conventional antiseptic dressings in a small randomised trial. They may be used as adjuncts, but only alongside guideline-based offloading, debridement, infection control, vascular assessment and glycaemic management. Rigorous trials with hard clinical outcomes are needed.

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