

Clinical Efficacy of Ayurvedic Interventions in Dushta Vrana Associated with Diabetic Foot Ulcer: A Case Report

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Abstract

Diabetic foot ulcers (DFUs) are a significant source of morbidity in patients with Type 2 Diabetes Mellitus, which often lead to chronic non-healing wounds, infections and amputations. Such ulcers are also correlated in Ayurvedic literature as *Dushta Vrana* especially when coupled with *Prameha*. The current case report reports the integrative management of a 68-year-old male with a chronic diabetic foot ulcer with a history of dry gangrene and history of previous toe amputation. This ulcer was Wagner Grade 2 and it was related to peripheral neuropathy. The first management was surgical disarticulation to debride the necrotic tissue because this prevented local infection. This was followed by a systematic Ayurvedic treatment regimen that is guided on the concept of *Vrana Shodhana* and *Vrana Ropana*. Oral preparations such as *Gandhak Rasayan*, *Manjisthadi Vati*, *Mehaabhaya Kashaya* as well as *Kaishor Guggulu* were used together with local wound care using *Jatyadi Taila* and normal debridement. It was noted over the two months period with progressive wound healing, discharge reduction and considerable wound contraction without recurrence or other complications. This case illustrates how an integrative method with necessary form of surgery alongside classical Ayurvedic treatment can be very fruitful in the treatment of diabetic foot ulcers. This kind of holistic approach helps in treating local wound pathology and global metabolic imbalance, which is a promising approach to complex, chronic wounds related to diabetes.

Introduction

DFUs can be classified as one of the most handicapping chronic complications of Type 2 Diabetes Mellitus, which it leads to high patient morbidity, quality of life, and healthcare load across the globe. It has been shown that the risk of a DFU in diabetic patients is estimated at 15-25 years, the ulcers represent a significant percentage of non-traumatic lower-limb amputations [1,2]. DFUs etiopathogenesis is multifactorial in that it includes peripheral neuropathy, micro- and macroangiopathy, impaired immune response and sustained hyperglycemia disrupting wound healing and predisposing infection [3]. Though the new wound care methods have been developed, the incidences of recurrence are high, and a significant proportion of ulcers develop to gangrene or may need surgical interventions that reflect the shortcomings of monotherapeutic methods [4].

In terms of Ayurvedic Ayurvedic diabetic foot ulcers may be associated with Dushta Vrana especially when they develop as a complication of Prameha. Vrana Chikitsa in classical Ayurvedic texts, in particular Acharya Sushruta, gives a detailed account of the

etiology, classification, and management of wounds, with much emphasis on the participation of Dosha-Dushya-Srotos in incurable non-healing wounds [5]. Pramehajanya Dushta Vrana has been described as a state where tissue vitality is poor, Kleda is excessive, Agni is impaired and Rogi Bala is low and this can be closely related with the contemporary definition of delayed wound healing in diabetic patients. Systematic therapeutic measures that are outlined in Sushruta, Shashti Upakrama are purification of the wound (Vrana Shodhana) and healing promotion (Vrana Ropana) and avert complications [6].

Over the last few years, integrative methods of combining necessary surgical and conventional interventions with Ayurvedic therapies have been of increasing concern as they aim to improve wound healing results in DFUs. A number of recent research and case studies have been found to show promising outcomes of Ayurvedic formulations, leech therapy, and medicated dressings when applied in addition to conventional diabetic management [1,2,7]. This form of integrative management is not

only aimed at local wound pathology but also metabolic, and immunological dysfunction on a global metabolic and immunological scale that leads to chronicity. The current case study will help bring to the fore the clinical effectiveness of an integrative Ayurvedic and surgical intervention in the treatment of Dushta Vrana that accompanies diabetic foot ulcer in as far as its potential in enhancing healing results and decreasing recurrence.

1 Literature Review

The phenomenon of diabetic foot ulcers (DFUs) has been widely reported in the contemporary medical as well as Ayurvedic literature as one of the critical complications of a long-term diabetes mellitus, which eventually leads to infection, gangrene, and amputation of the limbs unless properly managed. Modern integrative research has been focusing more on the utility of integrating the Ayurvedic principles of wound management with conventional medical or surgical care. Sreenadh and Dudhamal [1] demonstrated a case series that showed that Vrana Chikitsa used with modern wound care provided healthy granulation and total wound contraction in 1.5 months with no relapse. In a similar finding, Anjali and Parmar [2] claimed that Jalaukavacharana

(leech therapy) and Jatyadi Ghrita (sulphuric acid) made a significant increase in the healing of diabetic foot ulcers, which emphasizes on the necessity of blood purification and wound care. Patel and Duragappa [3] also endorsed the Ayurvedic classical interventions, whose wound healing and glycemic control were significant with the help of the procedures such as Ksharakarma and Jalaukavacharana, in a diabetic patient.

Cases have been reported on the effectiveness of certain Ayurvedic preparations and external treatments in the treatment of Dushta Vrana. Periyasami and Mahadevan [4] tested Virana Sanjeevi Thailam as a wound dressing in Madhumegha Viranam and found that it had better wound healing parameters. Sudha [5] also wrote about Dushta Vrana in diabetic patients as per the wound management principles of Sushruta, which proves the applicability of Shashti Upakrama. The extensive analysis by Javed and Das [6] revealed the therapeutic promise of some external Ayurvedic preparations in Vrana Chikitsa and presented a pharmacological foundation to their antimicrobial, anti-inflammatory, and tissue-regenerative action. All the studies highlight the fact that Ayurvedic topical application is

pivotal in the management of the chronic non-healing ulcer.

Evidence base is further reinforced by clinical studies that are conducted on specific formulations and procedures. Sharma et al. [7] tested Daruharidra Rasakriya Lepa in chronic non-healing ulcers and found it to have a significant discharge and improvement on the granulation tissue. Even though it is not the case with diabetic ulcer, Sushma and Rakesh [8] showed that pressure ulcers could be managed successfully with Ayurvedic interventions, which proves the generalizability of the principles. In a randomized controlled trial, Ratheesh and Gururaja [9] determined the effectiveness of Haridra Arka in chronic non-healing ulcers, and they provide a higher-level of clinical evidence of Ayurvedic wound care. Khandelwal et al. [10] also highlighted the systemic action of the Shodhana therapies like Virechana in terms of wound healing.

The latest integrative and diabetic-based studies are very relevant to the current case. Katkar et al. [11] found positive results of integrative management of diabetic foot ulcer with shorter healing period and better quality of life. Sood et al. [12] conducted a study on Nimbadi Taila Vrana Basti in chronic ulcers

and the relevance of site-specific Ayurvedic treatment. Meena et al. [13] have proved the efficacy of Ubhayaparimarjana Chikitsa in the Nada of Madhumehajanya Dushta Vrana, and normalization of clinical and laboratory parameters. Patil et al. [14] demonstrated that Ayurvedic therapy as a compound of oral hypoglycemics remarkably improved wound healing in diabetic wounds whereas Naz et al. [15] reported wound healing in full one month by internal medicines and wound debridement.

The use of Ayurveda in the management of diabetic wounds is getting more and more acceptable as evidenced in the current literature. A comparative clinical trial on the effects of Arjunadi Ointment and cadexomer iodine, proposed by Patil and Asutkar [16] is the evidence of the growing interest in scientifically validating Ayurvedic preparations. In the study by Biradar et al. [17], there were reported successful healing process of non-healing ulcers by classical Ayurvedic protocols. According to Gadve and Cheke [18], diabetic wounds were healed completely in 30-40 days using only internal medications and local cleansing. In a study by Mavale and Das [19], Ayurveda conservative management of

Dushta Vrana had been demonstrated with full healing whereas in a study by Rodrigues and Gopikrishna [20], Ayurveda had been discussed in comprehensive management of Madhumehajanya Dushta Vrana. Taken together, these studies support the clinical significance of Ayurvedic interventions in the treatment of diabetic foot ulcers and give an excellent basis to the current integrative case report.

2 Methodological Approach

2.1 Study Design and Nature of the Study

The current research is a single case, prospective, observational case re-port study aimed at determining the clinical efficacy of integrative management approach of combining necessary surgical intervention with classical Ayurvedic therapeutics in management of Dushta Vrana related to diabetic foot ulcer (DFU). The method was set up in such a manner that wound progression, systemic response, and healing outcome were recorded in a specified treatment and follow-up period, as per CARE case report guidelines and Ayurvedic clinical principles.

2.2 Study Setting and Duration

This research was carried out at the Department of Shalya Tantra, the Parul Institute of Ayurveda and Research, Parul University, Vadodara, Gujarat, a tertiary care teaching institution.

The length of observation was two months that took place in the following:

- First examination and surgery.
- Ayurvedic post-operative management.
- Serial wound examination and recording.

2.3 Patient Selection and Ethical Considerations

A 68-year-old male patient with a known case of Type 2 Diabetes Mellitus and a chronic non-healing foot ulcer was picked on the basis of clinical presentation. Informed consent was signed before it was initiated to be treated. Patient identity was highly confidential. The protocol of integrative treatment protocol was used in accordance with the institutional clinical practice standards.

2.4 Baseline Clinical Assessment

A thorough modern and Ayurvedic examination was done at baseline to get know of both the local wound pathology and the systemic involvement.

Table 1. Baseline Demographic and Clinical Profile

Parameter	Observation
Age	68 years
Gender	Male
Known illness	Type 2 Diabetes Mellitus (5 years)
Past surgical history	Right toe amputation
Presenting complaint	Non-healing ulcer with foul odor
Duration of ulcer	3 months
Site	Right sole
Wagner grade	Grade 2
Neuropathy	Present
Gangrene	Dry gangrene present

2.5 Laboratory and Diagnostic Evaluation

A thorough modern and Ayurvedic examination was done at baseline to get know of both the local wound pathology and the systemic involvement.

Table 2. Baseline Laboratory Investigations

Investigation	Result
Hemoglobin	10.2 g/dL
Total WBC count	11,000 /cu mm
Blood urea	24 mg/dL
Serum creatinine	0.7 mg/dL
Urine albumin	Nil
Urine sugar	Nil
Pus cells	3–4 /hpf
C-Reactive Protein	1:16

2.6 Ayurvedic Diagnostic Framework (Samprapti Ghataka)

Individualized therapy was carried out by analyzing the disease based on the Ayurvedic principles.

Table 3. Ayurvedic Diagnostic Parameters

Component	Observation
Nidana (Etiology)	Abhigata, Prameha
Dosha involvement	Vata (Vyana, Apana), Pitta (Pachaka), Kapha (Avalambaka)
Dushya	Rasa, Rakta, Mamsa, Meda
Srotas	Rasavaha, Raktavaha, Medovaha
Agni	Vishama
Roga marga	Bahya
Rogi bala	Avara

2.7 Intervention Protocol

The treatment protocol was executed in **two sequential phases**: infections and transform the wound into manageable condition.

Phase I: Surgical Management

Surgery was done under local anesthesia (ankle block) because of dry gangrene and necrotic tissue. Full removal of the non-viable tissue was performed according to the usual aseptic surgical practice to avoid systemic

Phase II: Ayurvedic Therapeutic Management

Post-operatively, classical Ayurvedic management was initiated focusing on *Vrana Shodhana* and *Vrana Ropana*.

Table 4. Internal Ayurvedic Medications

Drug	Dose	Frequency	Therapeutic Rationale
Gandhak Rasayan	2 tablets	Twice daily	Immunomodulatory, antimicrobial
Manjisthadi Vati	2 tablets	Twice daily	Raktashodhana, anti-inflammatory
Mehaabhaya Kashaya	15 ml	Twice daily	Glycemic regulation, Prameha management
Kaishor Guggulu	2 tablets	Twice daily	Anti-inflammatory, tissue repair

Table 5. Local Wound Care Protocol

Procedure	Frequency	Purpose
Jatyadi Taila dressing	Daily	Antiseptic, granulation promotion
Slough removal	Alternate days	Debridement, healthy tissue formation
Wound cleaning	Daily	Infection prevention

2.8 Outcome Assessment Criteria

Clinical outcomes were assessed using:

- Reduction in wound size
- Appearance of healthy granulation tissue
- Reduction in discharge and foul odor
- Absence of secondary infection
- Overall wound contraction and epithelialization

Serial photographic documentation was used to objectively record wound healing at admission, one month, and two months of treatment.

2.9 Follow-up and Monitoring

The patient was followed up regularly with regard to:

- Local wound status
- Signs of infection
- Tolerance to drugs Systemically.
- Glycemic stability

The duration of treatment was free of any adverse reactions and complications.

3 Clinical Outcomes and Wound Healing Progression

Serial wound assessment, photographic documentation, and observation of systemic and local parameters were used to assess the clinical outcomes after two months of follow-up. These results were measured in regards to wound size, tissue properties, discharge, infection, granulation tissue as well as wound contraction as a whole. The changes which take place in the course of integrative management in the order can be attributed to the gradual transformation of Dushta Vrana to Shudha Vrana in the Ayurvedic texts.

3.1 Baseline Clinical Status at Admission

During the admission, the patient was found to have a chronic non-healing ulcer on the right sole with foul odor, purulent discharge, slough-covered wound bed, and induration around the ulcer. Ulcer margins were uneven and inflamed, and the floor was pale, which showed a lack of vascularity of the tissues and

their low vitality. The physical examination showed characteristics of peripheral neuropathy such as loss of monofilament sensation and diminished sensation of vibration which also led to delayed wound healing. There was a clear line of demarcation of dry gangrene and this required immediate surgical intervention.



Figure 1. Wound status at the time of admission showing necrotic tissue, slough, and features of Dushta Vrana.



Figure 2. Immediate post-disarticulation wound status following surgical excision of necrotic tissue.

The baseline results showed that the Dushta Vrana was at an advanced stage, with compromised local tissue response and systemic diabetic milieu having a negative impact on wound repair mechanisms.

3.2 Early Post-Intervention Phase (Weeks 1–2)

After surgical disarticulations and Ayurvedic management was commenced, foul odor and purulent discharge significantly reduced during the first week. Wound bed was slowly seen to be clean with decreased slough and exudate. Jatyadi Taila wound dressing and removing slough on alternate days helped in effective Vrana Shodhana. Inflammation of the

wound margins decreased, and the induration around the margins decreased significantly. Secondary infection and wound deterioration were not seen at this stage.

There was a clinical decrease in the colonization of the wound as an infected, necrotic lesion to a less infected, more responsive wound healing environment, indicating a strong interaction between the surgical debridement procedure and Ayurvedic wound purification procedure.

3.3 Intermediate Healing Phase (After 1 Months)

At the end of the first month, the wound showed evidence of healthy granulation tissue, even pinkish-red wound bed, and wound depth and surface area were reduced significantly. The discharge was minimal and non-purulent and the edges of the wound had early evidences of epithelial migration. The healthy skin around was also healthier with the tissue color and no local temperature increase.



Figure 3. The appearance of wounds in one month of integrative treatment with a healthy granulation tissue and shrinkage of wounds.

The stage was indicative of successful Vrana Ropana, with the aid of internal medicines like Gandhak Rasayan, Manjisthadi Vati, and Kaishor Guggulu, which presumably led to better immunity, lesser inflammation, and tissue healing. The patient said that the problem of appetite and sleep had improved, which is a sign of an improved overall physiological balance.

3.4 Late Healing Phase (After 2 Months)

The wound was found to be almost healed, with significant wound contraction, mature epithelial tissue and no discharge, slough or infection, at the end of two months. The wound surface was stable and dry, and the

continuity of the tissue had been restored and there was no recurrence. The patient could walk without additional discomfort and wore protection shoes; his or her confidence during everyday activities was enhanced.



Figure 4. The wound condition at 2 months of therapy with almost perfect healing and epithelialization.

Progressive recovery that was witnessed in each of these stages demonstrates the usefulness of the integrative strategy in the treatment of complex diabetic wounds and elimination of consequent complications.

Table 6. Summary of Clinical Outcome Parameters

Parameter	At Admission	After 1 Month	After 2 Months
Wound discharge	Purulent, foul-smelling	Minimal	Absent
Slough	Present	Absent	Absent
Granulation tissue	Absent	Healthy	Mature
Wound size	Large	Reduced	Near complete closure
Infection signs	Present	Absent	Absent

3.5 Graph-Based Outcome Visualization and Quantitative Healing Assessment

A graphical analysis of the wound healing process was created to supplement the photo documentation of the patient and clinical observations. The graph combines two vital healing metrics over time; wound surface area reduction and a composite healing index. The visualization of this type offers an objective

interpretation of the wound response to the integrative management protocol.

- X-axis: Time interval (Admission, 1 Month, 2 Months)
- Primary Y-axis: Wound surface area (cm²), which shows contraction of physical wounds.

- Secondary Y: Healing Index (%), a compound clinical score that is based on measures like discharge, quality of granulation tissue, and epithelialization as well as lack of infection.
- The dual-axis format enables both the local regression and the general quality of healing to be evaluated and thus provide a more detailed interpretation than wound size.

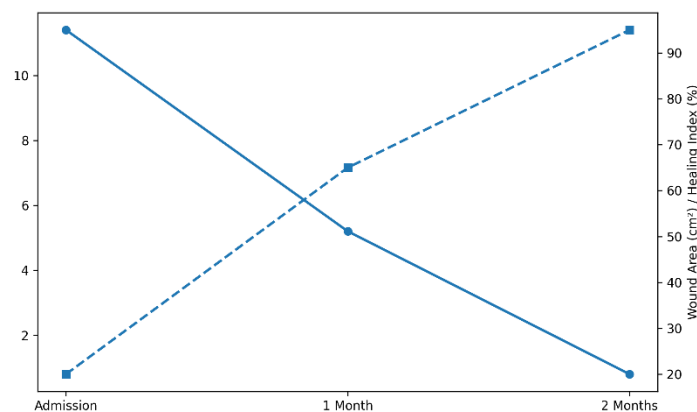


Figure 5. Sequential wound healing progression showing reduction in wound area and improvement in healing index over time.

The wound area was maximal at admission, and the index of healing was low, which is the evidence of low tissue viability and active pathology. A sharp reduction in wound area was identified during the first month after surgical disarticulation, and Ayurvedic therapy was employed, and the healing index increased significantly. After two months, the wound site was almost at full closure, whereas the index of healing was on a high plateau which denoted mature granulation, epithelialization, and consistent wound healing with no recurrence. This is a harmonized enhancement of

surgical intervention and Ayurvedic Vrana Chikitsa.

4 Comparative Interpretative Analysis

Conventional modalities that have been of use in the treatment of diabetic foot ulcer (DFU) have been surgical debridement, antibiotics, pressure offloading and management of glycemia. Nevertheless, even with these measures, they usually take a long time to heal, recurrence is high, and amputation probability is high [1,11]. Ayurvedic and integrative modalities have been discussed in recent literature which have shown better wound

healing results with a modulation of local and systemic variables in a holistic manner [2,3,14]. The current case provides a rare chance to comparatively examine the results of an integrative surgery Ayurvedic approach to care and conventional care and Ayurveda-only cases that are called in modern literature.

The traditional DFU management usually takes a long period of from 10 to 16 weeks to heal the wound especially when the cases are complicated by neuropathy or gangrene [1,11]. Ayurveda-focused case reports that use modalities like Jalaukavacharana, Ksharakarma or herbal dressings have shown comparatively quicker healing, typically in 6-10 weeks, in addition to concentrating on the systemic redress of Prameha and Dushta Vrana pathology [2,3,15,18]. Nevertheless, most Ayurveda-only methods cannot be used in cases of delayed initial wound stabilization in

situations where there is widespread necrosis or gangrene. The approach taken in the current study addresses this loophole by using early surgical disarticulation to immediately remove non-viable tissue, which is followed by a systematized Ayurvedic Vrana Shodhana and Vrana Ropana, making it a combination of the two systems.

In order to place the comparative effectiveness of various treatment strategies into the proper visual perspective, a methodology-based healing duration graph was built with the data trends found in recent DFU literature [1-3,11,14,15]. The chart is an average time of wound healing when using three general management strategies conventional care, Ayurveda-only interventions, and the integrative approach which is used in the current research.

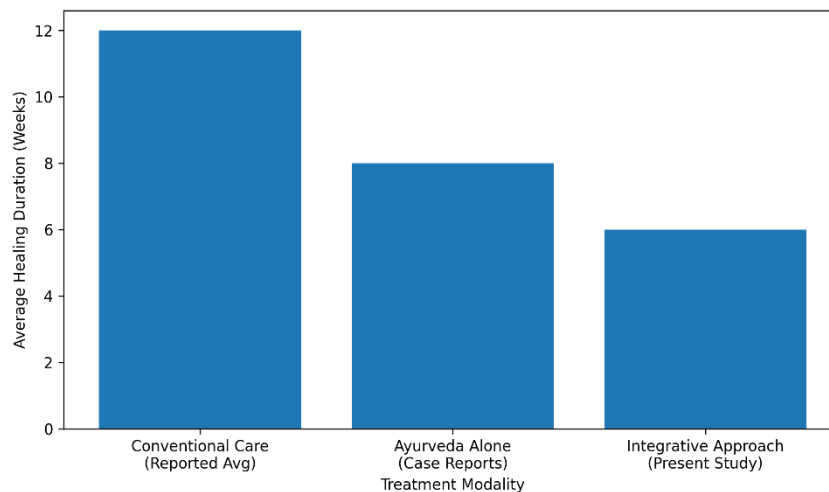


Figure 6. Comparative Healing Outcomes Across DFU Management Approaches

The graph shows that traditional DFU treatment is linked to the longest healing period, in part, because of the continued microvascular impairment, reoccurring infection, and insignificant effect on the overall metabolic dysfunction [1,11]. Intervention of Ayurveda-only demonstrates better recovery periods, due to increased local wounds, anti-inflammatory herbs preparation, and metabolic correction of the body [2,3,18]. The integrative method, which was used in the given case, was the shortest in terms of healing duration, which means that the necrotic burden was removed early due to surgical intervention and tissue regeneration was promoted with the help of Ayurvedic medications.

Such an expedited healing process is in line with integrative case reports of Sreenadh and Dudhamal [1] and Katkar et al. [11], who highlighted shorter healing period with and better wound quality using combined methodologies. This is further supported by the current research showing the sequential wound contraction, the consistency of epithelialization and the absence of recurrence during two months in a patient with that history of amputation, and impaired healing capacity.

5 Conclusion

As it is illustrated in the current case report, a combination of the necessary surgical intervention and classical Ayurvedic treatment might prove to be beneficial in the treatment of Dushta Vrana related to diabetic foot ulcer.

Premature disarticulation of the surgical site was highly significant in the removal of necrotic, as well as local infection control, and thus transforming an unresponsive, gangrenous base states to a responsive healing surface. The Ayurvedic management, which was based on the principles of Vrana Shodhana and Vrana Ropana, was able to induce rapid granulation, gradual wound contraction and constant epithelialization. The progression of clinical findings, demonstrated with the use of photography and quantitative graphical analysis, clearly show that there is no relapse of wounds healed, despite the fact that the patient had a damaged healing potential and a history of prior amputation.

Moreover, this case suggests how the Ayurveda holistic model is strong to not only treat local wound pathology but also the systemic factors underlying the local pathology, including metabolic disproportion, depressed immunity, and sustained inflammation, which make the wound chronic. Internal preparations such as Gandhak Rasayan, Manjisthadi Vati, Mehaabhaya Kashaya, and Kaishor Guggulu as well as local use of Jatyadi Taila worked together to improve tissue regeneration and stabilize the health of the system. The

comparative interpretative analysis indicates that this form of integrative management can provide better effects in comparison with traditional or Ayurveda-mono therapeutic approach, especially in complex cases of diabetic foot ulcers where mono-therapeutic treatment frequently does not work.

Though this case report findings are positive, increased clinical trials, such as controlled trials and cohort studies designed in a larger scale are needed to ascertain the reproducibility and generalizability of integrative surgical-Ayurvedic protocols management of diabetic foot ulcers. Future studies can be aimed at standardized integrative treatment algorithms, the use of objective wound assessment means, biochemical results, and long-term follow-up to measure the recurrence rates and quality of life outcome. Also, comparative cost-effectiveness trials and multicentric trials may serve as additions to the evidence base, which may result in a wider acceptance and implementation of Ayurveda-based interventions in mainstream diabetic wound care.

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