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CASE REPORT

DIABETIC FOOT ULCER: A CASE STUDY

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ABSTRACT

Prevalence of diabetic complications is a burden to the society in the present. Number of amputation and deaths associated with it are increasing day by day; such facts urge to clinicians and researchers to develop more effective wound treatments for patients suffering from diabetic non healing wounds. A male patient, 48 years old, who was diagnosed with diabetes mellitus over ten years, presented with a non-healing ulcer since two months. He was treated for *Dusta vrana* (a non-healing wound) using both internal and externally Ayurvedic therapies. The wound healed fully after four months. During the entire treatment period and follow-up period, no adverse drugs reaction was noticed with this treatment plan. The study found that the therapeutic intervention had fine scarring and *Vrana ropana* (wound healing) activity. The current approach indicates the better outcome with Ayurvedic therapeutic wound care approach towards diabetic foot.

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INTRODUCTION

Diabetes mellitus (DM) is a prevalent metabolic disorder that has a major impact on public health. A major consequence of diabetes mellitus, diabetic foot ulceration (DFU) is caused by a number of pathogenic factors, including peripheral vascular dysfunction and neuropathy. Furthermore, because of the weakened immune system and reduced microcirculation, ulcers are more prone to infection. ^(1, 2) About 8% of diabetic people get foot ulcers, and 1.8% require amputation. ⁽³⁾ As diabetes is a rapidly expanding illness, providing better care is necessary today more than ever. The patient in this case was treated according to an Ayurvedic wound care regimen. The common trio of neuropathy, ischemia, and infection characterizes diabetic foot because the tissues that are high in glucose are more prone to infection and the development of ulcers. ⁽⁴⁾

The conventional remedies include wound care management, antibiotic administration, glucose control, surgical interventions such as amputations or wound debridement, or specialized therapies including skin grafting and negative pressure wound therapy. ⁽⁵⁾ In Ayurveda diabetic foot can be correlated with *Prameha janya upadravas* (~complications of diabetes). In *Charaka samhita*, it is described in details, out of which *Putimansa* (~putrefaction of tissue) is major one. ⁽⁶⁾ In *Sushruta samhita*, *Acharya sushruta* has described that

Prameha pidaka (~eruptions as complication of diabetes) *Prameha* (~diabetes) and mentioned *Shastrapranidhana* (~surgical treatments) and *Vranakriyopaseva* (~ wound care) in its management if *Paka* (~pus formation) occurs in *Varna's* (~Wounds). ⁽⁷⁾ *Acharya Sushruta* describes *Shashti upakramas* (~sixty therapeutic measures for wounds) for wound healing, which includes 60 Different Modalities. ⁽⁸⁾ Out of which some treatment modalities were selected to treat a case of Diabetic foot ulcer. In this study different herbo-mineral drugs with wound healing properties were given along with local application. Here, we successfully treated a case of Diabetic foot ulcer by using said treatment modalities.

Patient Information

On July 24, 2023, a 48-year-old male patient visited to our hospital complaining to have a foul-smelling, non-healing ulcer over the plantar aspect of his right foot that had been present for over two months. The patient had been diagnosed with diabetes for ten years, and despite taking anti-hyperglycaemic medications for the entire time, the condition was out of control. Patient was taking anti-hyperglycaemic agents viz. Tab. Gluconorm-GP2 (Glimepiride 2mg + Metformin 500mg + Pioglitazone 15 mg) twice a day and Tab. Vogli 0.3 mg once a day before meal.

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Table no. I Timeline Therapeutic intervention; focus and assessment (Prognosis of wound healing on each follow-up)

Date	Findings	Intervention:	Outcome
24/07/2023	Non healing ulcer with Discharge; Foul smell; Dead tissue with discolouration diagnosed as non-healing wound	Dressing :For first 7 days, special wound care instructions were given initially wound was cleaned with Betadine and Hydrogen Peroxide; later Jatyadi taila 5 ml mixed with 125 mg Kapardik bhasma and Kasis bhasma 65 mg was advised to apply over the wound regularly. Medicines:	No improvement in wound
08/08/2023	Mild Discharge; Mild foul Smell ; Dead tissue and discolouration at wound site	1. Kaishor guggul 500 mg Twice a day after food with Lukewarm water	Mild improvement
23/08/2023	No Discharge; No Foul smell; Dead tissue and discolouration at wound site	2. Saptamrut loha+ 250mg Rasmanikya + 125mg Twice a day after food with Lukewarm water Arogyavardhini vati 500mg	No discharge and foul smell from the wound
08/09/2023	Wound was Clear; No Pus Discharge ; No Dead wound tissue	3. Gandhak rasayan 500 mg Twice a day after food with Lukewarm water	Wider wound with margins much apart
23/09/2023	Patient got relief; Wound was healthy; Granulation tissue present; No pain at wound site	4. Brihat manjishtadi kwath churna for kwath (~decoction) 5 gm (20 ml) Twice a day after food	Wound with healthy granulation tissue No discharge from wound.
08/10/2023	Patient got great relief; Wound was healthy; Granulation tissue present; No pain at wound site	5. Jatyadi taila + Kasis bhasma + Kapardik bhasma for local Application on wound (Jatyadi Tail 5 ml mixed with 125 mg Kapardik bhasma and Kasis bhasma 65 mg)	Wound with healthy granulation tissue No discharge from wound
22/10/2023	Satisfactory wound healing; Wound margins healthy and floor filled with healthy; granulation tissue.	The above treatment plan was given from 24/7/2023 to 21/10/2023. Dressing: In 2 nd phase of wound dressing when foul smell and discharge was reduced, <i>Jatyadi taila</i> mixed with equal quantity of <i>Vranaropan taila</i> was advised to apply. In Both phases loose bandage was applied. Medicines: for next 30 days.	Patient got good relief Completely healed wound
6/11/2023	Wound was completely healed	1. Kaishor guggul 500 mg twice a day after food with Luke warm water. 1. Saptamrut loha 250mg twice a day after food with lukewarm water 2. Abhrak bhasma 125mg+ Kapardik bhasma 125mg+ Kasis bhasma 125mg+ twice a day after food with lukewarm water Swarna makshik bhasma 125mg+ Aamalaki churna 2gm 3. Brihat manjishtadi kwath churna For Decoction 5 gm. (20 ml) twice a day After food 4. Jatyadi Taila + Vranaropan Taila in equal quantity for local Application on wound. The above treatment plan was given from 22/10/2023 to 21/11/2023.	Patient was reviewed after 15 days. Surrounding skin was healthy. Normal skin appearance.

Two month before, patient was apparently normal. Then, a month ago, he found a small, spontaneous wound on the plantar aspect of his right foot with mild discharge that grew gradually to develop into a wide-open wound. At that time, there was no known external injury. The patient stated that there was a persistent, foul-smelling discharge. The wound was excruciating and naturally spreading. There was a history of coughing, nausea, and intermittent fever. Before the ulcer started, there was no prior medical history of injury. Patient received treatment from allopathic physician with minimal relief. Patient was taken Tab. Augmentin 625 mg twice a day, Tab. Chymoral BR thrice a day, Tab. Flagyl 400 mg thrice a day for one month. With the above therapy, no any sign of improvement was seen in the wound, so he was referred to a surgeon, who suggested ankle amputation. Owing to financial constraints and his refusal for amputation he looked for a different treatment options.

Clinical findings

Local examination: Right foot plantar surface, inferolateral aspect; approximately 5 x 3 cm; floor sloughed; edges well defined and sloped; thick and fibrosed proximally; margins poorly defined at distal ends; foul-smelling discharge; blackish discoloration of the right leg's little toe; surroundings oedematous with rise in local temperature. On general examination patient's appearance was distressed, Body built was normosthenic, and patient was well oriented to time, place and person. There was no sign of Pallor or Icterus. Patient's gait was limping gait. His Height is 175cm, BMI was 20.6 kg/m² and BP was 129/88 mmHg with pulse rate 120. On Systemic examination, his respiratory system shows bilateral air entry was clear and no any presenting symptoms was found. Cardiovascular System was normal and S1S2 Normal. On 12th July 2023, his fasting blood sugar levels and post prandial blood sugar was 200 mg/dl & 269 mg/dl respectively) & HbA1c was 9.3%.



Image 1 Before Treatment on 24/07/2023 Discharge, Foul smell, dead tissue with floor sloughed Infero-lateral surface of right little toe, Plantar aspect of the Right foot.



Image 2 1st Follow- up 08/08/2023 Mild Discharge, Mild Foul smell, Dead tissue and discolouration at wound site. Right foot plantar surface Infero-medial area of right little toe



Image 3 2nd Follow- up 23/08/2023 No Discharge, Foul smell, Dead tissue and discolouration at wound site. Slightly lateral rotated little toe of right foot, plantar surface Infero-medial area.



Image 4 3rd Follow-up 8/09/2023 No Discharge, Foul smell, Dead tissue and discolouration at wound site. Upright position of right little toe plantar aspect infero- lateral surface.

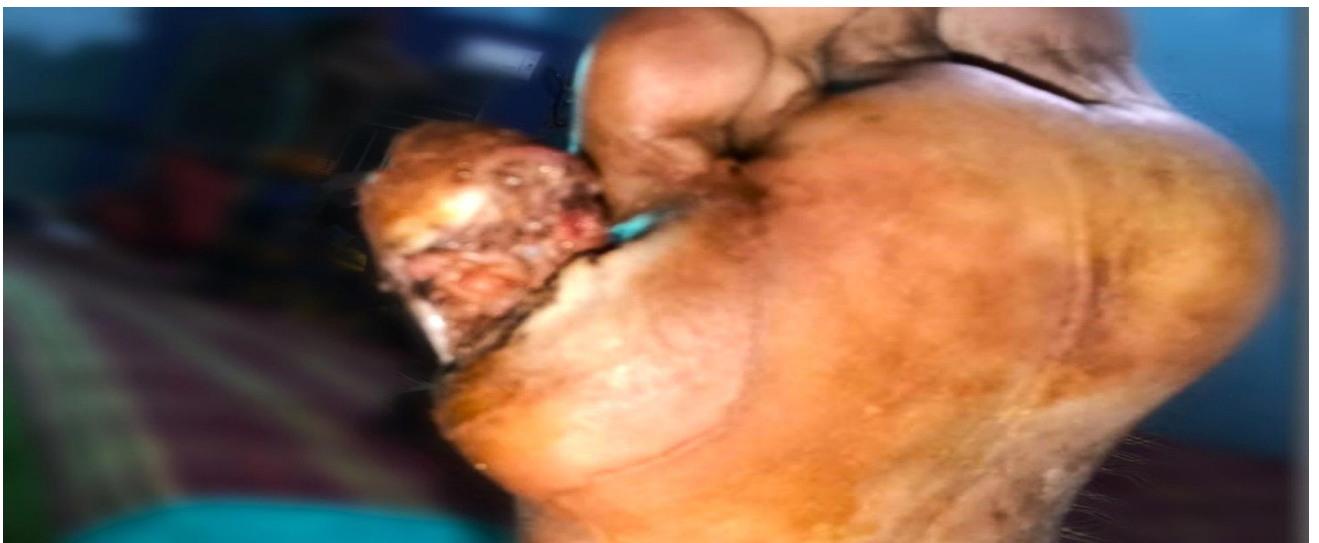


Image 5 4th Follow-up 23/09/2023 Wound was Clear, No Pus Discharge, No Dead wound tissue. Upright right little toe complete inferior surface.



Image 6 5th Follow-up 08/10/2023 Patient got great relief, Wound was healthy Healthy tissue- Granulation present, No pain at wound site, Focused inferior surface of right little toe.



Image 7 6th Follow up on 24/10/23 -Patient got great relief, Wound was healthy, Healthy tissue- Granulation present, No pain at wound site. Plantar aspect of right foot ,showing inferior aspect of little toe.



Image 8 7th Follow-up on 6/11/2023- Satisfactory wound healing, Wound was completely healed. Right lateral and inferior surface of right little toe.



Image 9 8th Follow-up: 21/11/23 -Upright inferior and whole lateral surface showing complete wound healing.

DISCUSSION

Diabetic Foot Ulcer may result in the patient's amputation, gangrene, infection, or death. However, only 30% of DFUs recover with typical treatment procedures in 20 weeks.⁽⁹⁾ Additionally, because DFUs are produced by multiple pathogenic pathways, a mono-therapy strategy would result in a relatively low percentage of recovery. Multimodal and interdisciplinary treatment are therefore required for DFU management.⁽¹⁰⁾ In this study, patient was managed with ayurvedic therapeutic intervention internally along with external application of *Jatyadi taila*. A mixture of herbo- mineral drugs which has antimicrobial property was suggested to consume orally. (Table no 1) Initially Patient got mild relief in first 15 days for foul smelling and pus discharge. (Image 1) The given drug *Kaishore guggulu* is indicated in non-healing ulcers and skin disorders as

it has blood purifying and anti-inflammatory and healing properties. *Saptamrut loha bhasma* contains *Ghritha* and *Madhu*, which have antiseptic, antibacterial, and anti-inflammatory qualities as well as healing and cleansing characteristics, is used to treat anemia and skin conditions.⁽¹¹⁾ One of the causes of skin conditions is blood impurity; so, *Rasmanikya*, which functions as *Raktashodhaka* to purify blood and relieve skin conditions, was given. An important treatment for a variety of skin infections is *Arogyavardhini Vati* which is rich in antioxidants, it eliminates free radicals from the body and, because of its antipruritic properties, it reduces itching associated with skin conditions.⁽¹²⁻¹⁶⁾ With its potent antibacterial, antimicrobial, antiviral, anti-inflammatory, and analgesic (decreasing soft tissue pain and tenderness) qualities, *Gandhak rasayan* has been shown to be the most effective in wound healing. *Brihat Manjishtadi*

Kwath is an effective antibacterial medication. . It is used as potent blood purifier which facilitates removal of toxins from the body. *Jatyadi taila* with its active ingredients cleanses wound and fastens the wound healing. ⁽¹⁷⁾ *Kasis bhasma* is indicated in diseases caused due to impurities of blood like ulcer, herpes, lecoderma, poisoning etc. ⁽¹⁸⁾ *Kapardik bhasma* is used as external application and also orally. It has *Katu Rasa* (~pungent), *Rooksha* (~dry), *Teekshna* (~piercing) properties, *Katu vipaka* (~taste conversion after digestion) *Ushna veerya* (~ hot potency). Due to this, it balances *Kapha* and *Pitta dosha* (~ regulatory functional factors of the body) and on external application it reduces secretions and make wound dry, it also reduces itching and burning sensation of ulcers. ⁽¹⁹⁾ Following treatment, patient's blood sugar levels (FBS-110 mg/dl & PPBS- 170 mg/dl), returned to normal. In classics, *Swarnamakshik bhasma* has been described as *Tikta* (~Bitter taste), *Madhura rasa* (~sweet) and used in skin diseases. It promotes healthy granulation by its anti-inflammatory and anti-ageing properties. *Amalaki churna* (*Embilica officinalis* Gaertn.corse) has *Amla* (~sore taste), *Madhura* (~sweet) *Tikta* (~Bitter) & *Katu rasa* (~pungent), *Ruksha* (~dry), *Laghu Guna* (~ light property), *Sheeta virya* (~cold potency) and *Madhura Vipaka* (~sweet bio transformed *Rasa*). In non-healing wounds it nourishes cells in order to promote granulation. ⁽²⁰⁾ When discharge and foul smelling was stopped, *Vranaropan Taila* along with *Jatyadi taila* was advised. *Vranaropan taila* ⁽²¹⁻²²⁾ cleanses wound and prevents infection, pus formation and promotes faster wound healing. Complete healing of the wound was achieved in four months. His follow up was continued every 15 days. (Image 2-9). In this particular case, the cumulative effect of the above mentioned multimodal treatments has produced significant outcomes, especially complete wound healing. The treatment was easily tolerated and there were no adverse effects either locally or overall.

CONCLUSION

The potential of Ayurvedic wound care concepts for diabetic foot ulcers has been proved and highlighted by this case study. With deliberate implementation of the Ayurvedic principles of wound care management including internal and external, non-healing- diabetic foot ulcers can be treated.

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for the publication of this case study and the photos along with it.

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