

## **Case study**

### **Impact of *Ingudi* (*Balanites aegyptiaca* Linn. Delile) seed oil on *Prameha***

#### ***Pidika* (Diabetic carbuncle): A case study**

#### **ABSTRACT**

**Background:** We **gone** a thorough the literature the use of medicinal plants and plant-based products for topical ulcers and discovered **the** natural products and **its**-derivatives account for more than half of all medications taken globally today. **Case presentation:** A fifty-eight-year-old gentleman **of** middle socioeconomic status developed a carbuncle **on** right side of the nape of the neck with firm edge and a necrotic **fowl smelling** slough on the floor. Despite his attempts to treat the carbuncle at home and nearby allopathic physicians "it continued to enlarge and fester" (became inflamed and suppurated). The patient was visited the Trauma Surgery **Out Patient Department (OPD), Banaras Hindu University (BHU)** Trauma center & Super specialty Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi, India, and, following surgical incision and drainage. ET nurse consultation for regular dressing but wound did not show the progressive healing, patient was referred to the **Ayurvedic OPD** wing of Banaras Hindu University for **Ayurvedic** management. **Sushruta used *Ingudi* oil for the management of vitiated/chronic wounds.** This case study aims to anticipate the clinical efficacy of ***Ingudi*** seed oil in the treatment of chronic diabetic wounds **without causing any side effect**, which is a complex type of Diabetic carbuncle (*Prameha pidika*). **Conclusion:** ***Ingudi*** seed oil has prompt healing properties against diabetic wounds. ***Ingudi*** seed oil is natural, safe, and cost-effective **material used in** chronic diabetic wounds (*Prameha pidika*).

**Keywords:** *Ingudi*, Carbuncle, Wound, *Pidika*

## Background

Diabetes is a serious illness in which a person's body cannot control the level of sugar occurring in 8.3 percent of the world's population [1]. Skin disease will occur in 79.2% of people with diabetes [2]. Carbuncle is a common among the skin diseases also known as infectious gangrene and is most commonly caused by *S. aureus*, which usually begins with boil around the root of a hair follicle [3]. Diabetic carbuncle is called *Prameha Pidika* as per *Ayurveda*. In *Ayurveda*, *Prameha* (Diabetes) is a urinary disease, while *pidika* refers to carbuncle, Carbuncle is a technical term for *pidika* Diabetic carbuncles (*Prameha pidika*) are the common complications of urinary disorders importantly Diabetes mellitus. Sushruta explained a separate chapter on the use of *Sneha* (oil), in which Ingudi oil was used in vitiated/chronic wounds [4].

## Introduction

Diabetes a metabolic disorder found to be associated with various diseases and complications among which Diabetic ulcers is the most common, if ignored often to limb amputation. In general, diabetic wounds exhibit delayed wound healing as they fail or delayed the progress of the normal wound healing. There is a number of factors that play pivotal roles in the wound healing process such as age, wound site, disease state, immune state, diet. Thus, the management of diabetic ulcers possesses a major therapeutic as well as a financial challenge throughout the world. Ingudi (*Balanites aegyptiaca* Linn. Delile) known as 'Desert Date' is a small evergreen tree [Figure 1]. It is traditionally used in the treatment of various ailments i.e. Leukoderma, worm infection, wounds, epilepsy, dysentery, constipation, diarrhea, hemorrhoid, stomach aches, asthma, fever and help to control the *Vata dosha* [5].

## Case presentation

### Study center

Trauma surgery OPD, BHU Trauma center & Super specialty Hospital, Institute of Medical Sciences, Banaras Hindu University, Varanasi, 221005

A fifty-eight-year-old gentleman belongs to middle socioeconomic status reported in the study center on 5th September 2017. Painful non-healing ulcer over the nape of the neck with symptoms indicative of possible foul odor discharge for 6 months [Figure 1]. The size of the wound was 5x3 cm with a firm edge and necrotic slough on the floor with minimal foul-smelling purulent discharge [Figure 2]. Vitals showed Pulse 82/minute; temperature 98.70F; B.P. was 128/76 mm of Hg while the biochemical tests showed raised ESR (36 mm/hrs.) and total leucocytes count (9000/mm<sup>3</sup>); Neutrophil (43%); Packed cell volume (40%); fasting blood sugar 186 mg /dl, postprandial sugar 290mg/dl. The previous treatment was surgical debridement, local steroidal ointment; with a Povidone-Iodine dressing after wound debridement, the patient was taking broad-spectrum antibiotics, multivitamins, anti-inflammatory, and analgesic drugs. In spite of treatment taken, his wound is not healing, then he preferred for Ayurvedic treatment in the Ayurvedic wing of Banaras Hindu University.

### Plant Material Collection

*Ingudi* (*Balanites aegyptiaca* Linn. Delile) fruit seeds were obtained from Munaganj village, Etawah district, Uttar Pradesh, India, after scientific authentication at Dravyaguna Department, Faculty of Ayurveda, Banaras Hindu University, Varanasi, with accession number DG / 1819 / 194(nuts).

### Extraction of Oil Seed

Direct expeller method (mustard oil expeller machine) was used to get *Ingudi* oil. Hard shell of fruit was removed to get soft seed. Seeds was directly subjected to compression to get 43% w/w yellow colored *Ingudi* oil. It's inexpensive, chemical-free, and versatile.

### Therapeutic Focus and Assessment

The patient was investigated and applies to *Ingudi* oil started just after wound debridement and dressing. The patient was advised for proper dressing and applies *Ingudi* oil spread round the wound two times a day. All drugs used in previous treatment were stopped except oral hypoglycemic drugs (Amaryl-M-1 BD; Metformin 500 mg and Glimepiride 1 mg).

### Result

In this study, malodor was controlled after 15 days [Figure 3] and discharge was controlled after 30 days [Figure 4]. The surrounding skin color returned to normal within 45 days [Figure 5]. Pain sensation at the wound site recovered within 30 days due to neovascularization (Bates-Jensen Wound Assessment Tool). The signs of infection disappeared on day 30, the size of the wound was completely reduced in 45 days, and healed. Oral hypoglycaemic drugs normalize both the Fasting blood sugar (100 mg/dl) and Post prandial glucose (138 mg/ml) level.

## Discussion

Adults are frequently affected by carbuncles [6]. The carbuncle is a large painful swelling on the skin with many pus-filled openings. The human pathogenic gram-positive bacteria, *staphylococcus sp.*, and *Streptococcus sp.* cause carbuncle. Carbuncle is a common ailment that affects the diabetic patient and more sensitive sites for this infection are the napes of the neck, back, and buttock [7]. In ancient times female patients have been able to cure diabetic wounds with *Ingudi* seed oil [8]. People all over the world have been benefiting from the traditional system of medicine for thousands of years [9]. According to an allopathic system of medicine, antibiotics are given early in the treatment of carbuncles, followed by incision and drainage [10]. The seed oil properties, *Krimighna* (antibacterial) and *Vishaghna* (antioxidant) helped control topical infection and ultimately fight odor [11]. In phytochemical studies, presence of phenolic compounds, saponin glycosides, tannins, flavonoids, proteins, amino acids, fats, oils, and volatile oils are present, these phytochemicals regulate to enhance wound repair and skin regeneration [12]. Due to the astringent and antimicrobial properties of flavonoids and tannins in *Ingudi* seed oil responsible for wound healing by enhancing epithelialization, and speed up the non-healing process [13]. The *Snigdha Guna* (unctuous property) of *Ingudi* oil helped to control the violation of *Vata* (responsible entity for pain) and helped alleviate the pain. *Ingudi's* anti-inflammatory and analgesic activity helps control wound pain [14]. *Ingudi* seed oil is a potent chronic wound healer and it will be assuring natural drug in skin diseases, to heal burn wounds, and to cure worms [15]. Oleic acids and linoleic acid are the main fatty acids found in *Ingudi* followed by palmitic acid and stearic acid [16]. The pro-inflammatory effect of oleic and linoleic acids may speed up the wound healing process by stimulating production of cytokine-induced neutrophil chemoattractant in inflammation 2 alpha/beta (CINC-2alpha/beta) [17]. The most common bacteria for infectious gangrene of the skin is *S. aureus*, and previous study

revealed that Ingudi oil shows a significant effect on antimicrobial activity against *S. aureus* [18]. Patient was not taking the oral hypoglycemic drug as prescribed by physician so, the blood sugar after wound healing was raised which was fasting blood sugar 156 mg/dl and post prandial blood sugar 248 mg/dl. Hence it can be said that wound healed with *Ingudi* oil even though the blood sugar was raised. This showed that *Ingudi* oil can be a very good and economical product for wound in future.

## Conclusions

Chronic diabetic wound healed by topical application of *Ingudi* oil in expected period of time. It has the property and potential to heal the complex wounds in shorter time and is less expensive.

## Disclaimer regarding Consent and Ethical Approval:

As per university standard guideline, participant consent and ethical approval have been collected and preserved by the authors

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**Figure 1:** Stage wise pictures of the diabetic wound during the intervention. A. wound on the first day before intervention (Size- 5 x 3 cm) B. wound after 15<sup>th</sup> day (Size- 4.6 x 2.8 cm) C. Wound after 30<sup>th</sup> day (Size- 2.8 x 1.6 cm) D. wound after 45<sup>th</sup> day (completely closed)



**Figure 1:** *Balanites aegyptiaca* Linn. Delile Plant with fruit



**Figure 2:** Wound status on first consultation



**Figure 3:** Wound status on 15<sup>th</sup> day after treatment



**Figure 4:** Wound status on 30<sup>th</sup> day after treatment



**Figure 5:** Wound status on 45<sup>th</sup> day after treatment