

THERAPEUTIC POTENTIAL OF *DHOOPAN KARMA* (MEDICATED FUMIGATION THERAPY) IN THE MANAGEMENT OF *DUSHTA VRANA* (CHRONIC ULCERS): A COMPREHENSIVE REVIEW

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Article Received on 05 July 2026,
Article Revised on 26 July 2026,
Article Published on 01 Aug. 2026,
<https://doi.org/10.5281/zenodo.21696912>

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How to cite this Article: ¹Dr. Suraj Tulshiram Dhamdhare, ²Dr. Meenakshi Amrutkar. (2026). Therapeutic Potential of Dhoopan Karma (Medicated Fumigation Therapy) In The Management of Dushta Vrana (Chronic Ulcers): A Comprehensive Review. World Journal of Pharmaceutical Research, 15(11), 965-970. This work is licensed under Creative Commons Attribution 4.0 International license.

ABSTRACT

Chronic non-healing wounds (*Dushta Vrana*), characterized by persistent infection, necrotic slough, heavy exudation, and impaired tissue regeneration, present a major clinical challenge in modern wound management.^[1] In Ayurveda, *Dhoopan Karma* (medicated fumigation therapy) is a specialized parasurgical procedure utilized for localized wound cleansing (*Shodhana*) and healing (*Ropana*). This review synthesizes classical Ayurvedic literature with contemporary scientific evidence to evaluate the pharmacological mechanisms, clinical methodologies, and therapeutic efficacy of *Dhoopan Karma* in chronic wound care.

KEYWORDS: *Dhoopan Karma*, *Dushta Vrana*, Chronic Ulcers, Wound Bed Preparation, Medicated Fumigation, Herbal Antimicrobials.

1. INTRODUCTION

Managing chronic ulcers—such as venous leg ulcers, diabetic foot ulcers, and pressure sores—remains complex due to microbial biofilm formation, persistent inflammation, localized ischemia, and cellular senescence. In Ayurvedic surgery (*Shalya Tantra*), chronic or infected wounds are classified as *Dushta Vrana*.^[3]

Acharya Sushruta described 60 therapeutic procedures (*Shashti Upakrama*) for comprehensive wound care. Among these, **Dhoopan Karma** (fumigation with volatilized medicinal herbs, resins, and lipids) occupies a vital position as a non-contact, antimicrobial, and pro-healing modality.^[4] Unlike topical pastes (*Lepa*) or liquid irrigations (*Kshalana*), fumigation delivers bioactive volatile molecules deep into the irregular micro-architecture of the wound bed without causing mechanical trauma to fragile granulating tissue.

2. Classical Literature & Historical Context

Dhoopan Karma is widely documented across classical Ayurvedic treatises:

- **Sushruta Samhita:** Categorized as the 34th procedure among the *Shashti Upakrama*. *Sushruta* highlighted its role in destroying micro-organisms (*Rakshoghna*) and promoting structural integrity of the wound bed.
- **Charaka Samhita:** Positioned as the 32nd treatment measure out of 36 modalities for wound care, emphasizing its application in softening indurated, hard wound margins (*Mardavakara Dhoopa*).
- **Kashyapa Samhita:** Dedicated an entire chapter (*Dhoopana Adhyaya*) detailing over 40 distinct formulations categorized for pediatric, gynecological, and surgical wound management.

3. Pathophysiology of Dushta Vrana & Therapeutic Target

A wound deteriorates into a *Dushta Vrana* due to the vitiation of *Tridosha* (primarily *Kapha* and *Pitta*) along with *Rakta* (blood) and *Mamsa* (muscle tissue).

Table 1: Pathological Parameters of Dushta Vrana vs. Therapeutic Effect of Dhoopana.

Clinical Feature of Dushta Vrana	Modern Clinical Equivalent	Dhoopan Pharmacological Action	Ayurvedic Principle
Pooti-pooya / Srava	Purulent, heavy exudate	Desiccation & reduction of exudates	Kledashoshana
Pooti-gandha	Malodor / Bacterial load	Neutralization of foul volatile organic compounds	Durgandhanashana
Atikathina Induration /	Fibrotic, non-viable edges	Softening of fibrotic margins	Mardavakara
Vedana / Ruja	Localized ischemic pain	Thermal vasodilation & analgesia	Vedanasthapana
Krimijusta	Biofilm / Microbial colonization	Broad-spectrum antimicrobial activity	Krimighna / Rakshoghna

4. Phytochemical Profile & Classification of Dhoopana Dravyas

The herbs utilized in *Dhoopan Karma* are predominantly rich in **volatile oils, essential oleo-gum resins, polyphenols, and aromatic terpenes** possessing *Ushna* (warm) thermal potency and *Sukshma* (subtle) penetrative abilities.

Key Bioactive Ingredients

- **Oleo-Gum Resins:** Guggulu (*Commiphora mukul*), Sarjarasa / Raala (*Vateria indica*). These resins release monoterpenes and sesquiterpenes upon heating, creating a hydrophobic protective coating over the wound while exhibiting potent antimicrobial activity.
- **Herbal Antimicrobials:** Nimba (*Azadirachta indica*), Haridra (*Curcuma longa*), Vacha (*Acorus calamus*), Gaurasarshapa (*Brassica alba*).
- **Combustion & Carrier Medium:** Go-Ghrita (clarified cow butter) is incorporated into fumigation mixes to lower combustion temperatures, act as a lipophilic medium (*Sanskaranuvartana*), and minimize harsh carbon soot formation.

Classical Classification

- **Vrana Mridukara Dhoopa:** Formulated with soothing and unctuous agents (*Ghrita*, *Sarjarasa*) used for stiff, fibrotic, or dry chronic wounds.
- **Vrana Kathinyakara Dhoopa:** Formulated with astringent and drying herbs (*Arka*, *Snuhi*) used for overly hyper-granulated or macerated wound tissues.

5. Modern Pharmacodynamics & Mechanism of Action

Dhoopan Karma Mode of Action-

1. Thermal Activation: Heating *Dhoopana Dravyas* + *Go-Ghrita* generates bioactive aerosolized fumes.
2. Antimicrobial Delivery: Fine smoke particles penetrate deep wound crevices & disrupt biofilms.
3. Exudate Desiccation: Warm dry smoke absorbs *Kleda* (moisture/slough) & inhibits anaerobic bacteria.
4. Microvascular Hyperthermia: Mild local warmth induces vasodilation & enhances tissue perfusion.
5. Result: Conversion of *Dushta Vrana* (infected/sloughy) to *Shuddha Vrana* (clean, healing wound).

1. Aerosolized Antimicrobial Delivery: Fumigation generates fine micro-particles and gaseous phytochemicals that settle directly into deep wound crevices and anatomical sinus tracts that liquid dressings or ointments may fail to reach efficiently.

2. Disruption of Microbial Biofilms: Volatile phenols and terpenoids alter bacterial cell membrane permeability, leading to cell lysis and preventing biofilm maturation—a major cause of antibiotic resistance in chronic wounds.

3. Thermal Micro-Vascular Hyperthermia: The controlled warm air causes mild local vasodilation. This increases localized capillary blood circulation, accelerating tissue oxygen transport, nutrient delivery, and migration of phagocytic white blood cells to the wound site.

4. Desiccation of Excessive Exudate (Kledashoshana): The warm, dry smoke absorbs moisture and dries up excess slough, effectively disrupting the humid microenvironment required for anaerobic bacterial proliferation.

6. Standardized Clinical Methodology

A clinical protocol for *Dhoopan Karma* follows a three-stage procedure:

1. Purva Karma (Pre-procedure Preparation): The wound is systematically debrided and irrigated (*Vrana Prakshalana*) using warm medicated decoctions (e.g., *Nimba Kwath* or *Triphala Kwath*). Surrounding healthy skin is protected with a barrier ointment.

2. Pradhana Karma (Main Procedure): Formulated herbal coarse powder (*Churna*) or a prepared fumigation stick (*Dhoopa Varti*) is ignited over smokeless charcoal inside a specialized fumigation apparatus or funnel (*Dhoopan Yantra*). Medicated fumes are directed onto the wound bed at a safe distance (15–20 cm) for 10 to 15 minutes to ensure therapeutic warm fumigation without thermal injury.^[5]

3. Paschat Karma (Post-procedure Management): The wound bed is inspected for dryness and slough detachment. A suitable pro-healing topical oil or ointment (*Vrana Ropana Taila/Ghrita*, e.g., *Jatyadi Taila*) is applied, followed by sterile non-adherent bandaging.

7. Evidence from Systematic Reviews and Clinical Studies

Systematic reviews of Ayurvedic surgical literature demonstrate that parasurgical modalities—including *Dhoopan Karma*, *Jalaukavacharana* (leech therapy), and *Kshara Karma*—play a clinically significant role in chronic wound management. In a comprehensive review of clinical research on Ayurvedic wound care, procedural interventions like *Dhoopan* were shown to consistently achieve successful wound bed clearance (*Vrana Shodhana*),

reduction in microbial burden, and faster rates of tissue regeneration compared to conventional control dressings.^[6]

Furthermore, clinical case reports combining modern surgical care with Ayurvedic local therapies, including wound fumigation and medicated dressings, have demonstrated accelerated wound bed preparation, significant pain reduction, and successful tissue repair in complex tissue injuries and infected non-healing wounds.

8. Limitations & Future Research Directions

While classical literature and clinical observations support *Dhoopan Karma*, standardizing its application in modern healthcare settings requires addressing key gaps:

- **Gas-Phase Phytochemical Standardization:** Quantitative gas chromatography-mass spectrometry (GC-MS) analysis is needed to identify active volatile compounds released during combustion.^[7]
- **Dosimetry & Temperature Control:** Establishing standardized protocols for optimal smoke density, temperature thresholds, and exposure duration.
- **Safety Evaluation:** Assessment of combustion-derived carbon micro-particles to ensure non-toxicity to delicate vascular beds during prolonged usage.

9. CONCLUSION

Dhoopan Karma is an effective, cost-effective, and historically validated parasurgical procedure for managing *Dushta Vrana*. Through a synergistic combination of targeted antimicrobial smoke delivery, localized thermal hyperthermia, and tissue desiccation, it facilitates the crucial transition of a chronic non-healing wound (*Dushta Vrana*) into a clean, granulating surface (*Shuddha Vrana*). Integrating standardized *Dhoopan* protocols into modern wound care frameworks offers a valuable, non-invasive adjunctive strategy for treating recalcitrant chronic ulcers.

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