**RESEARCH PAPER**

# Current Perspectives on the Role of Lepa Kalpana in DushtaVrana

**Dr. Priti Yadav[1], Dr. Avnish Pathak[2]**

*[1]Ph.D. Scholar, Department of Shalya Tantra, FIMS, SGT University Gurugram, Haryana & Associate Professor , Department of Shalya Tantra, Ishan Ayurvedic Medical College & Research Centre, Greater Noida, U.P.*
*[2]Professor and HOD, Department of Shalya Tantra, FIMS, SGT University Gurugram, Haryana*

**ABSTRACT**

**Background**: DushtaVrana is one of the most extensively described surgical conditions in Ayurveda. It is characterized by persistent inflammation, infection, slough formation, foul discharge, pain, and delayed healing. Despite advances in modern wound care, chronic wounds continue to pose significant therapeutic and economic challenges worldwide. Ayurveda advocates a multimodal approach to wound management, among which Lepa Kalpana (topical herbal paste application) occupies a prominent place as a BahirparimarjanaChikitsa. Classical Ayurvedic texts describe numerous Lepa formulations possessing Shodhana (wound cleansing), Ropana (healing), Vedanasthapana (analgesic), Shothahara (anti-inflammatory), and Krimighna (antimicrobial) properties.

Objective: This review critically evaluates the current perspectives on the role of Lepa Kalpana in the management of DushtaVrana by integrating classical Ayurvedic principles with contemporary pharmacological and clinical evidence.

**Material and Methods**: A comprehensive narrative review was conducted using classical Ayurvedic texts including the Sushruta Samhita, Charaka Samhita, Ashtanga Hridaya, Chakradatta, BhaishajyaRatnavali, and Sharangadhara Samhita. Relevant studies investigating phytochemistry, pharmacological activities, wound-healing mechanisms, and clinical outcomes of topical Ayurvedic formulations were critically analyzed.

**Results**: Classical literature consistently recommends Lepa Kalpana for cleansing infected wounds, reducing inflammation, controlling microbial contamination, promoting granulation tissue formation, and accelerating epithelialization. Modern investigations demonstrate that herbal constituents commonly employed in Lepa formulations exhibit antimicrobial, antioxidant, anti-inflammatory, angiogenic, collagen-promoting, and immunomodulatory activities.

**Conclusion**: Lepa Kalpana represents a scientifically promising topical therapeutic intervention that complements modern wound care principles. Future research should prioritize pharmacological standardization, microbiological evaluation, wound-healing, safety assessment and well-designed multicentric randomized clinical trials.

**Keywords**: DushtaVrana, Lepa Kalpana, VranaChikitsa, Wound healing, Topical herbal formulation, Shodhana, Ropana...

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## 1.INTRODUCTION

DushtaVrana or non-healing ulcers constitute a major global health burden owing to prolonged healing time, recurrent infections, increasing antimicrobial resistance, frequent hospitalizations, and substantial healthcare expenditure. Conditions such as diabetic foot ulcers, venous leg ulcers, pressure ulcers, traumatic wounds, and postoperative wound infections significantly impair patient's quality of life. Despite remarkable advances in surgical techniques, antimicrobial therapy and advanced wound dressings, delayed wound healing remains a persistent clinical challenge, particularly among elderly individuals and patients with diabetes mellitus, peripheral vascular disease, malnutrition, and immunocompromised states.

Management of DushtaVrana in Ayurveda is based upon two fundamental therapeutic principles: VranaShodhana (wound purification) and VranaRopana (promotion of wound healing). Classical texts advocate a comprehensive approach incorporating internal medications, dietary regulation, surgical procedures, para-surgical interventions, and external therapeutic modalities. Among these, Lepa Kalpana has received considerable attention because of its ability to deliver bioactive phytoconstituents directly to the affected tissue.

Lepa Kalpana involves the external application of finely processed herbal formulations prepared with appropriate liquid media such as water, gomutra, takra, ghrita, taila, or herbal decoctions. Its therapeutic potential mainly depends on the pharmacological properties of the ingredients. According to Ayurvedic principles, Lepa facilitates DoshaShamana, reduces local inflammation, absorbs excessive exudate, alleviates pain, controls microbial proliferation, promotes tissue regeneration, and restores physiological integrity of the affected tissue. Pharmacological studies further indicate that many herbs incorporated in classical Lepa formulations possess antimicrobial, antioxidant, anti-inflammatory, angiogenic, collagen-stimulating, and immunomodulatory activities, thereby supporting

**Author for Correspondence:*

traditional claims.

The growing global interest in evidence-based traditional medicine has stimulated scientific evaluation of Ayurvedic wound management. Several experimental and clinical studies have reported encouraging outcomes using formulations such as PanchavalkalaLepa, AragvadhadiLepa, and NimbadiLepa in chronic wounds, diabetic ulcers, infected traumatic wounds, and postoperative wound care. Nevertheless, the available evidence remains fragmented, and comprehensive critical reviews integrating classical concepts with modern scientific findings are limited.

Therefore, the present review aims to critically examine the current perspectives on the role of Lepa Kalpana in DushtaVrana management by synthesizing classical Ayurvedic knowledge, phytochemical and pharmacological evidence, experimental investigations, clinical studies, and future research opportunities. Such integration may facilitate broader scientific acceptance and contribute to the development of standardized evidence-based topical Ayurvedic wound-care strategies.

## 2. CONCEPT OF DUSHTA VRANA IN AYURVEDA

The term DushtaVrana is one of the most extensively described disease entities in Shalya Tantra. It represents a wound that has undergone pathological changes due to persistent vitiation of Doshas, microbial contamination, tissue necrosis, impaired circulation, or inappropriate treatment. Such wounds fail to progress through the normal stages of healing and require comprehensive management aimed at wound cleansing (Shodhana) followed by tissue repair (Ropana).

The pathological sequence involves:

DoshaPrakopa → RaktaDushti → Mamsa Dhatu involvement → Srotorodha → Local inflammation → Tissue necrosis → Infection → Delayed healing → DushtaVrana

This concept closely resembles the modern understanding of chronic wound pathology involving prolonged inflammation, microbial colonization, oxidative stress, tissue hypoxia, excessive protease activity, and impaired angiogenesis.

The classical description of DushtaVrana includes features such as:

Vedana - Persistent pain
Shotha – Swelling and inflammation
Srava - Excessive discharge
Durgandha - Foul smell
Vaivarnya - Abnormal discoloration
Puti – Putrefaction or unhealthy wound
Daha - Burning sensation

Depending upon the predominant Dosha, wounds may exhibit different clinical manifestations.

Among the sixty wound management measures (Shashti Upakrama) described by Acharya Sushruta, topical therapies such as Lepa, Parisheka, Avachurnana, Varti, Taila, Ghrita, and Bandhana play a significant role.

## 3. CLASICAL FOUNDATION OF LEPA KALPANA

Lepa Kalpana refers to the external application of a freshly prepared herbal paste over the affected area. The paste is generally prepared by triturating medicinal drugs with suitable liquid media such as water, Gomutra, herbal decoctions, Takra, milk, Ghrita, Taila, or Swarasa depending on the disease condition.

Lepa is considered an important form of BahirparimarjanaChikitsa (external therapy), producing both local and systemic therapeutic effects through transdermal absorption.

Classification of Lepa:

Based on therapeutic purpose, Lepa can be classified into:

1. DoshaghnaLepa

Prepared to pacify aggravated Doshas and restore physiological balance.

2. VishaghnaLepa

Used in poisoning, insect bites, and toxic wounds.

3. VarnyaLepa

Applied to improve complexion and restore normal skin appearance after healing.

From a clinical perspective, Lepa may also be classified as ShodhanaLepa, RopanaLepa, ShothaharaLepa, VedanasthapanaLepa, KrimighnaLepa.

Preparation of Lepa involves selection of genuine medicinal drugs, cleaning and drying (if required), pulverization into fine powder, trituration with an appropriate liquid medium, preparation of a homogeneous smooth paste, immediate application over the affected area. Fresh preparation is generally preferred because volatile phytochemicals retain maximum biological activity.

### 3.1 Mode of Action

The absorbed phytoconstituents pacify local Doshas, purify Rakta, reduce inflammation, improve tissue nutrition, and facilitate healing.

Modern science supports these actions through mechanisms including antimicrobial activity, anti-inflammatory effects, antioxidant action, moist wound healing, promotion of angiogenesis, collagen synthesis, fibroblast proliferation, enhanced epithelialisation, reduction of oxidative stress, immunomodulation.

### 3.2 Classical References of Lepa Kalpana in Ayurvedic Literature:

Lepa Kalpana is one of the oldest topical therapeutic modalities described in Ayurvedic classics. The concept is extensively elaborated in the Brihattrayi and Laghutrayi, where numerous formulations are prescribed for wounds, inflammatory conditions, skin disorders, poisoning, fractures, burns, and surgical diseases. Collectively, these texts establish Lepa as an important component of BahirparimarjanaChikitsa (external therapy).

Acharya Sushruta gave the most comprehensive description of wound management. Among the Shashti Upakrama (sixty therapeutic measures) for Vrana, Lepa occupies a prominent position because of its ability to cleanse wounds (Shodhana), reduce inflammation (Shothahara), alleviate pain (Vedanasthapana), and promote healing (Ropana).

Acharya Sushruta compares the action of Lepa to water extinguishing a burning house, emphasizing its ability to pacify locally aggravated Doshas rapidly.
Sushruta also described practical rules for application:
(a) Lepa should be freshly prepared
(b) It should be applied opposite the direction of hair follicles (Pratiloma) to facilitate better absorption
(c) It should not be retained after complete drying
(d) Repeated application over an already dried layer should be avoided
(e) The thickness of application should be appropriate according to the indication
These recommendations demonstrate an advanced understanding of topical drug delivery and local pharmacodynamics.

### 3.3 Mechanism of Action of Lepa Kalpana

The beneficial effects of Lepa arise from the integration of Ayurvedic principles with pharmacologically active phytoconstituents acting on multiple stages of wound healing.
According to Ayurveda, medicinal substances applied externally penetrate through Twak (skin), Romakupa (hair follicles), SwedavahaSrotas (sweat channels). These drugs pacify aggravated Doshas, purify Rakta, reduce inflammation, improve local circulation, and nourish damaged tissues, resulting in accelerated wound healing.

## 4. PHARMACOLOGICAL PERSPECTIVES OF LEPA KALPANA IN WOUND MANAGEMENT

Scientific evidence indicates that herbal Lepa formulations influence several phases of wound healing:

### 4.1 Antimicrobial activity

Many constituent herbs inhibit Gram-positive and Gram-negative bacteria as well as pathogenic fungi, thereby reducing infection and biofilm formation.

### 4.2 Anti-inflammatory activity

Flavonoids, terpenoids, and phenolic compounds suppress inflammatory cytokines such as TNF-α, IL-1β, and IL-6, reducing edema, pain, and tissue destruction.

### 4.3 Antioxidant activity

Reactive oxygen species delay healing by damaging cellular structures. Plant-derived antioxidants neutralize free radicals and protect fibroblasts from oxidative injury.

### 4.4 Promotion of angiogenesis

Several phytochemicals stimulate new blood vessel formation, improving oxygen delivery and nutrient supply to regenerating tissues.

### 4.5 Fibroblast proliferation and collagen synthesis

Natural bioactive compounds enhance fibroblast migration, collagen deposition, extracellular matrix remodeling, and tensile strength of healed tissue.

### 4.6 Epithelialization

Herbal formulations accelerate keratinocyte migration, resulting in faster wound closure and restoration of skin integrity.

### 4.7 Immunomodulation

Certain phytochemicals regulate macrophage activity and growth-factor expression, facilitating orderly progression through the inflammatory and proliferative phases of healing.
Collectively, these mechanisms support the traditional Ayurvedic concept that Lepa simultaneously performs VranaShodhana and VranaRopana, making it particularly useful in the management of chronic infected wounds. Modern reviews of plant-derived wound therapeutics consistently report antimicrobial, antioxidant, collagen-promoting, and angiogenic actions of phytochemicals, providing biological plausibility for these classical formulations.

## 5. CHALLENGES AND LIMITATIONS

Despite promising preliminary findings, several limitations remain, including variation in formulation composition, lack of standardisation, small clinical sample sizes and differences in assessment parameters.
Further studies should investigate formulation-specific safety, stability, pharmacological activity and clinical effectiveness.

## 6. FUTURE RESEARCH PERSPECTIVES

Future research should focus on:
(a) Phytochemical standardisation of Lepa formulations.
(b) Antimicrobial validation through standardised microbiological studies.
(c) Evaluation of anti-inflammatory and antioxidant activities.
(d) Experimental assessment of collagen deposition and epithelialisation.
(e) Development of standardised topical dosage forms. Multicentric randomised clinical trials.

## 7. DISCUSSION

This classical concepts of Vrana Shodhana and Vrana Ropana provide a useful therapeutic framework for understanding the role of Lepa Kalpana in wound management.
However, the available evidence remains limited by differences in study methodology, formulation composition, sample size and treatment duration.
Therefore, future research should establish a relationship between formulation composition, pharmacological mechanisms and objectively measured wound-healing outcomes.

## 8.CONCLUSION

Lepa Kalpana represents an important component of the classical Ayurvedic approach to external wound management. Its therapeutic relevance can be understood through Vrana Shodhana and Vrana Ropana.
Emerging clinical research suggest that selected Ayurvedic topical formulations may have potential

applications in wound management. However, further standardisation, safety assessment and adequately powered clinical trials are necessary to establish their effectiveness

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