

Review Article

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ROLE OF RAKTAMOKSHANA BY JALAUKAVACHARANA IN INFLAMMATORY AND MICROCIRCULATORY DISORDERS: A CLASSICAL AND CONTEMPORARY REVIEW

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ABSTRACT

Background: *Raktamokshana*, one of the principal *Shodhana* therapies in *Ayurveda*, is employed for the expulsion of vitiated blood (*Dushta Rakta*) to alleviate a variety of disorders, particularly those of inflammatory and microcirculatory origin. *Jalaukavacharana* (leech therapy) is a specialized form of *Raktamokshana* recognized for its gentle, safe, and effective bloodletting, especially in delicate individuals and in conditions involving *Pitta* and *Rakta* vitiation. Modern studies have corroborated its utility in managing chronic inflammatory, vascular, and dermatological disorders by improving microcirculation, reducing inflammation, and modulating immune responses. **Aim:** To critically review the classical concepts, proposed mechanisms, clinical efficacy, and safety of *Raktamokshana* by *Jalaukavacharana* in the management of inflammatory and microcirculatory disorders. **Objectives:** To explore classical *Ayurvedic* references and indications of *Jalaukavacharana*. To examine the physiological and pathological rationale for bloodletting in inflammatory and circulatory disorders. To analyze the proposed mechanisms of action from both *Ayurvedic*

and modern biomedical perspectives. To review clinical evidence and research findings on its efficacy and safety. To suggest future research directions for integrative therapeutic applications. **Materials and Methods:** A comprehensive literature review was conducted using classical *Ayurvedic* texts (*Sushruta Samhita*, *Charaka Samhita*, *Ashtanga Hridaya*), modern *Ayurvedic* treatises, and electronic databases (PubMed, Scopus, AYUSH Research Portal, DHARA, Google Scholar). Relevant clinical trials, case reports, and experimental studies published up to 2025 were analyzed. **Results:** Classical texts advocate *Jalaukavacharana* for a wide spectrum of conditions including *Vatarakta*, *Kustha*, non-healing ulcers, varicose veins, and localized inflammatory disorders. Modern studies reveal significant improvements in symptoms such as pain, swelling, skin discoloration, and vascular insufficiency. Mechanistically, *Jalaukavacharana* is proposed to reduce local inflammation, improve microcirculation, modulate cytokine activity, and exert anticoagulant and analgesic effects through bioactive substances present in leech saliva (e.g., hirudin, calin, destabilase). **Conclusion:** *Raktamokshana* by *Jalaukavacharana* remains a clinically effective and safe therapeutic approach for various inflammatory and microcirculatory disorders. Integrative use alongside conventional therapies shows promise, though further high-quality randomized controlled trials and mechanistic studies are warranted to substantiate findings and develop standardized protocols.

KEYWORDS: *Raktamokshana*, *Jalaukavacharana*, leech therapy, inflammation, microcirculation, Ayurveda.

INTRODUCTION

Raktamokshana, the therapeutic expulsion of vitiated blood, is one of the five principal *Shodhana* (purification) therapies described in classical *Ayurveda*. Among its various methods, *Jalaukavacharana* (leech therapy) is particularly renowned for its gentle and effective action, making it suitable even for individuals with diminished strength (*Alpa Bala*), children, the elderly, and in sensitive anatomical locations. Classical texts such as *Sushruta Samhita* extol *Jalaukavacharana* for managing disorders characterized by *Rakta* and *Pitta* vitiation, including skin diseases (*Kustha*), inflammatory conditions, varicose veins, and non-healing ulcers.¹

In the modern clinical landscape, inflammatory and microcirculatory disorders—such as chronic venous insufficiency, vasculitis, diabetic foot ulcers, and psoriasis—pose significant

challenges. Conventional treatments often involve long-term pharmacotherapy, invasive surgical interventions, and are sometimes associated with side effects or limited efficacy. Increasingly, *Jalaukavacharana* has garnered attention as a complementary approach that may offer symptomatic relief and disease-modifying benefits while minimizing systemic side effects.²

Biomedical research has begun to validate the classical principles underlying *Jalaukavacharana*. Leech saliva contains a complex mixture of bioactive substances, including hirudin (anticoagulant), calin (platelet aggregation inhibitor), destabilase (fibrinolytic), anesthetics, and anti-inflammatory molecules. These compounds collectively improve blood flow, reduce local inflammation, relieve pain, and promote tissue healing. This aligns with the Ayurvedic concept of removing *Dushta Rakta* to relieve *Srotorodha* (channel obstruction) and restore normal physiological function.³

Despite the promising outcomes reported in both traditional practice and modern studies, standardized clinical protocols, robust randomized controlled trials, and detailed mechanistic studies remain limited. This review aims to consolidate classical concepts and contemporary clinical evidence on the role of *Raktamokshana* by *Jalaukavacharana* in managing inflammatory and microcirculatory disorders, highlighting its therapeutic potential, safety profile, and future directions for integrative medical practice.⁴

AIM AND OBJECTIVES

Aim:

To review the classical principles, mechanisms, clinical efficacy, and safety of *Raktamokshana* by *Jalaukavacharana* in inflammatory and microcirculatory disorders.

Objectives:

1. To explore classical indications and concepts of *Jalaukavacharana*.
2. To analyze mechanisms of action (*Ayurvedic* and biomedical).
3. To review clinical efficacy and therapeutic outcomes.
4. To assess safety and reported adverse effects.
5. To suggest future research directions.

MATERIALS AND METHODS:

A comprehensive literature review was conducted using classical *Ayurvedic* texts (*Sushruta Samhita*, *Charaka Samhita*, *Ashtanga Hridaya*), modern *Ayurvedic* treatises, and electronic databases including PubMed, Scopus, AYUSH Research Portal, DHARA, and Google Scholar. Clinical trials, observational studies, case reports, and experimental research related to *Raktamokshana* by *Jalaukavacharana* in inflammatory and microcirculatory disorders were included for analysis.⁵

CONCEPTUAL STUDY

Raktamokshana is derived from the Sanskrit words *Rakta* (blood) and *Mokshana* (letting out or liberation). It refers to the therapeutic expulsion of vitiated blood to prevent or treat diseases caused by *Dushta Rakta*. *Jalaukavacharana* (*Jalauka* = leech, *Avacharana* = application) specifically denotes bloodletting performed with the help of medicinal leeches.⁶

TYPES OF JALAUKAVACHARANA

Classically, leeches are divided into:

1. **Savisha (poisonous)** – Not recommended for therapy.
2. **Nirvisha (non-poisonous/medicinal)** – Suitable for therapeutic purposes. *Sushruta* lists these as safe for clinical use.

Types of Jalaukavacharana

According to *Acharya Sushruta* (*Sushruta Samhita*, Sutrasthana 13/5–10), leeches are classified based on their properties and safety for therapeutic use.

1. Savisha Jalauka (Poisonous Leeches)

- These leeches naturally reside in dirty, marshy, stagnant, and polluted water bodies such as swamps, muddy ponds, and ditches.
- They feed on the blood of unhealthy animals and thus accumulate harmful toxins in their bodies.
- Physical characteristics described include rough and sharp skin, dark or dull coloration, foul smell, and aggressive biting nature.

- Applying such leeches can result in **adverse effects**, including severe local inflammation, itching, burning sensation, blister formation, fever, suppuration, and even systemic toxicity.
- Therefore, **Savisha Jalauka** are **strictly contraindicated** for therapeutic purposes.⁷

2. Nirvisha Jalauka (Non-Poisonous or Medicinal Leeches)

- These leeches inhabit clean, unpolluted water bodies such as clear ponds, wells, and rivers.
- They feed on the blood of healthy animals and thus are considered free from harmful toxins.
- *Sushruta* mentions their soft, smooth texture, non-aggressive nature, and generally greenish or bluish appearance with well-marked dorsal stripes or spots.⁸

Therapeutic leeches belong to this category.

- They are safe and effective for clinical applications and are especially recommended for gentle bloodletting (*Mridu Shodhana*).
- In modern practice, **Hirudo medicinalis** and related species are commonly used and scientifically validated for medicinal use.

CLASSIFICATION OF JALAUKAVACHARANA

A. Based on the Nature of Leeches (According to Sushruta)

Type	Subtypes	Description
Savisha (Poisonous)	-	Leeches found in dirty, stagnant, and polluted waters. Not safe for clinical use. Cause itching, burning, swelling, and possible systemic toxicity.
Nirvisha (Non-poisonous/Medicinal)	-	Leeches inhabiting clean water. Smooth, soft skin. Greenish or bluish color. Calm nature. Safe and effective for therapeutic bloodletting.

B. Based on Size and Strength (As per Practical Ayurveda)

Category	Description	Usage
Laghu Jalauka (Small leech)	Smaller in size, mild bloodletting action.	Used for children, elderly, weak patients, and in sensitive areas.
Guru Jalauka (Large leech)	Larger, stronger bloodletting capacity.	Used for robust patients and severe or chronic conditions.

C. Based on Clinical Indications (Modern Perspective)

Type	Indication Focus
Dermatological use	Psoriasis, eczema, chronic skin lesions (<i>Kustha</i>).
Vascular use	Varicose veins, venous ulcers, deep vein thrombosis (<i>Vatarakta</i>).
Inflammatory use	Arthritis, bursitis, cellulitis, localized inflammatory swellings.
Reconstructive use	Plastic surgery, microvascular surgery (for venous congestion).

D. Based on Therapeutic Purpose

Type	Purpose
Mridu Shodhana (Mild purification)	For delicate patients and sensitive areas.
Madhyama Shodhana (Moderate purification)	For moderate strength patients and chronic conditions.
Tikshna Shodhana (Intense purification)	Rarely with Jalauka; usually other Raktamokshana methods are used for this.

Indications (Yogya Lakshana)⁹

As per classical texts and modern studies, *Jalaukavacharana* is indicated for:

- *Vatarakta* (gout, peripheral vascular disease)
- *Kustha* (psoriasis, eczema)

- Chronic non-healing ulcers and varicose ulcers
- *Arbuda* (tumors, cystic swellings)
- Venous insufficiency
- Inflammatory joint disorders (arthritis)
- Migraine and localized inflammations
- Certain ocular and ENT disorders

Contraindications (Ayogya Lakshana)¹⁰

- Severe anemia
- Hypotension
- Bleeding disorders (coagulopathy)
- Severe immunosuppression
- Pregnancy
- Skin infections or septicemia at the site of application

MODE OF ACTION (Samprapti Vighatana)¹¹

Ayurvedic Perspective:

- *Dosha Shamana*: Primarily pacifies aggravated *Pitta* and *Rakta*.
- *Srotoshodhana*: Clears obstructed microchannels (*Srotas*).
- *Vedana Shamana*: Reduces pain and swelling.
- *Rakta Prasadana*: Purifies blood and restores balance.

Nidana (Causative Factors)



Ahara-Vihara (Improper diet & lifestyle)

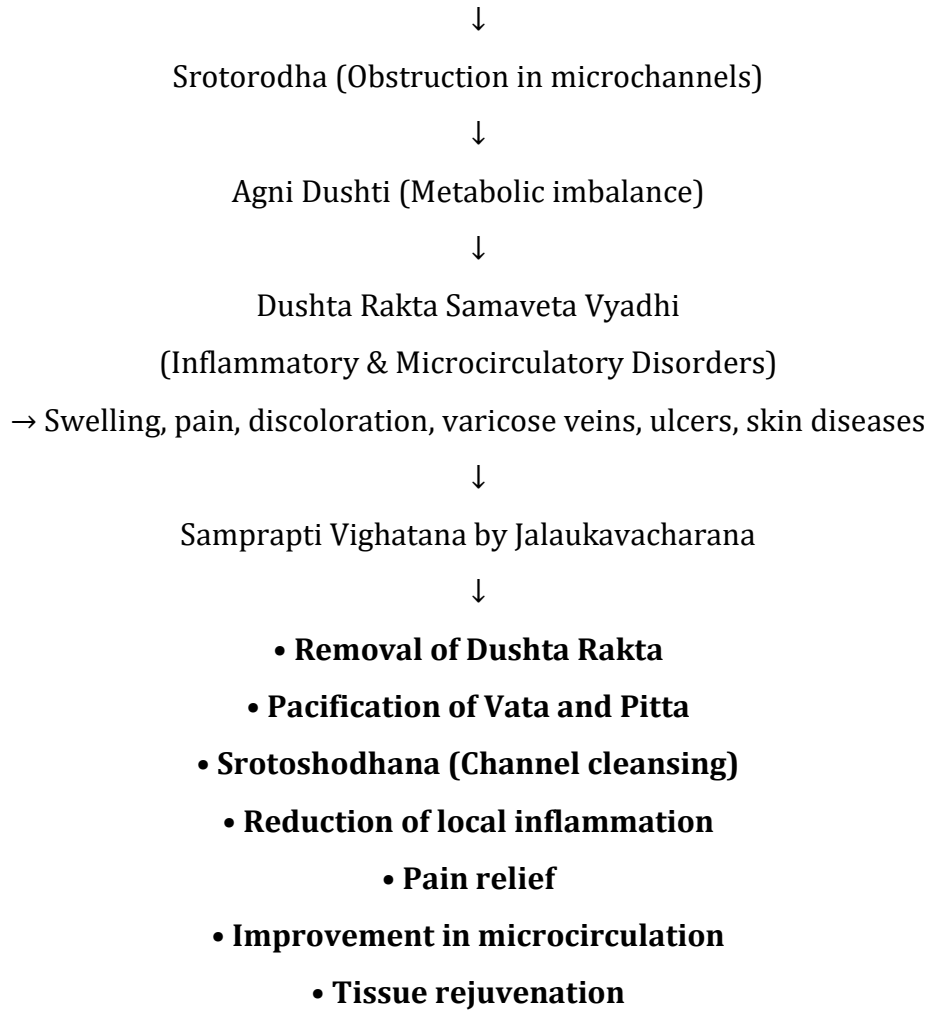
Stress, sedentary habits, junk food, smoking, alcohol



Dosha Prakopa (Aggravation of Vata and Pitta)



Rakta Dushti (Vitiation of blood)



Modern Perspective:

- **Mechanical Action:** Removal of congested and vitiated blood reduces local pressure and toxin load.
- **Pharmacological Action:** Leech saliva contains bioactive substances such as:
 - *Hirudin* (anticoagulant)
 - *Calin* (platelet aggregation inhibitor)
 - *Destabilase* (fibrinolytic)
 - *Hyaluronidase* (enhances tissue permeability)
 - Anesthetic and anti-inflammatory peptides
- **Immunomodulation:** Reduction of inflammatory cytokines (e.g., IL-6, TNF- α).
- **Improved Microcirculation:** Enhanced venous and lymphatic drainage and prevention of ischemia.

PROCEDURE (KARMA VIDHI)

The process of *Jalaaukavacharana* is systematically divided into three stages — *Poorva Karma*, *Pradhana Karma*, and *Pashchat Karma* — as per *Ayurvedic* classics like *Sushruta Samhita*, and followed in modern clinical practice with appropriate aseptic precautions.

1. POORVA KARMA (PRE-PROCEDURE)¹²

a. Assessment of Rakta Dushti and Patient Eligibility:

- The physician assesses the patient's *Prakriti*, *Vikriti*, *Rakta Dushti* signs, and overall strength (*Bala*).
- Indications, contraindications, and general health parameters (like hemoglobin levels, coagulopathies, and infection status) are evaluated.
- This ensures the safe application of leech therapy and helps determine the number and frequency of sittings.

b. Site Selection:

- The affected area showing signs of inflammation, swelling, varicosity, discoloration, or chronic skin lesions is chosen.
- Care is taken to avoid areas with ulcers showing active bleeding, thin skin, or varicose eczema.
- The site should have enough blood flow to allow effective leeching without undue risk.

c. Skin Cleaning and Preparation:

- The selected site is cleaned thoroughly using antiseptic solutions like povidone-iodine or sterile saline to remove dirt, oil, and debris.
- The skin is lightly scratched or punctured (if necessary) to initiate capillary oozing, which encourages the leech to attach easily.
- Medicinal leeches are prepared by washing them in clean water or turmeric water (as per classical references) to ensure their health and cleanliness.

2. PRADHANA KARMA (MAIN PROCEDURE)¹³

a. Application of Medicinal Leeches:

- The prepared leech is gently applied to the selected site.

- If the leech does not attach spontaneously, a small drop of milk or blood may be placed on the skin to attract it.

b. Observation During Attachment and Feeding:

- Once attached, the leech begins sucking blood rhythmically.
- The physician monitors the leech and patient throughout the procedure, ensuring that the leech feeds properly without causing discomfort.

c. Detachment of the Leeches:

- Leeches naturally detach when they have ingested an adequate amount of blood, usually within 20 to 60 minutes.
- If necessary, a small amount of turmeric powder or a gentle saline wash can be used to encourage detachment safely.

d. Number of Leeches:

- Depends on the severity of the disease, the extent of the lesion, the strength (*Bala*) of the patient, and the clinical judgment of the physician.
- Typically, 1 to 6 leeches may be applied in a single session.

3. PASHCHAT KARMA (POST-PROCEDURE CARE)¹⁴

a. Wound Cleaning and Antiseptic Dressing:

- After the leeches detach, the bite sites are cleaned gently with antiseptic solution.
- A sterile dressing is applied to control minor bleeding and prevent infection.
- Bleeding usually stops within a few hours due to natural hemostasis aided by the anticoagulant properties of leech saliva.

b. Monitoring for Bleeding or Infection:

- The patient is observed for prolonged bleeding, local swelling, signs of allergic reaction, or infection at the bite site.
- Appropriate care is taken if any adverse reactions occur.

c. Advising Rest and Light Diet:

- The patient is advised to rest post-procedure.

- A light, easily digestible diet (*Laghu Ahara*) is recommended to aid healing and restore energy.
- Physical exertion, exposure to cold, and heavy meals are avoided temporarily.

Samyak Lakshana (Signs of Proper Jalaukavacharana)

- Reduction in pain, swelling, and redness.
- Feeling of lightness and relief at the affected site.
- Improved local temperature and function.

Asamyak Lakshana (Signs of Improper Procedure)

- Excessive bleeding
- Local infection
- Allergic reactions
- Delayed wound healing

Proper technique and aseptic measures minimize these risks.

RAKTAMOKSHANA

Raktamokshana is derived from the Sanskrit words *Rakta* (blood) and *Mokshana* (liberation or release). It refers to the therapeutic expulsion of vitiated blood from the body as a form of *Shodhana* (purification). Among the five principal purification therapies (*Panchakarma*), *Raktamokshana* specifically aims at alleviating diseases caused by *Rakta Dushti* (vitiation of blood) and related *Dosha* imbalances, especially *Pitta* and *Vata*.¹⁵

Indications (Yogya Lakshana)¹⁶

As per classical texts and modern practice, *Raktamokshana* is indicated in:

- *Vatarakta* (Gout, peripheral vascular disorders)
- *Kustha* (Psoriasis, eczema, vitiligo)
- Chronic non-healing wounds and ulcers
- *Vidradhi* (abscess)
- Varicose veins and venous insufficiency

- Inflammatory joint disorders (arthritis)
- *Arbuda* (benign tumors and cystic swellings)
- Migraine, certain eye, and ENT disorders

Contraindications (Ayogya Lakshana)¹⁷

Raktamokshana is contraindicated in:

- Severe anemia
- Hypotension
- Bleeding disorders
- Pregnancy
- Severe dehydration or immunosuppression
- Skin infections or septicemia at the intended site

Methods of Raktamokshana (Types)

Sushruta describes several methods for bloodletting:

Type	Method	Indication
<i>Siravedha</i>	Venesection	Suitable for robust patients and deep-seated blood disorders
<i>Jalaukavacharana</i>	Leech therapy	Safe for delicate patients, children, elderly, and sensitive areas
<i>Prachchhana</i>	Superficial scarification	Skin diseases and localized swellings
<i>Alabu</i>	Application of vegetable gourds for suction	Superficial inflammatory swellings
<i>Shringa</i>	Application of animal horns for suction	Deep-seated inflammations
<i>Ghati Yantra</i>	Application of glass or metallic suction cups	Microcirculatory and superficial disorders

Among these, *Jalaukavacharana* is the safest and most widely practiced.

Ayurvedic Mode of Action (Samprapti Vighatana)¹⁸

- **Dosha Shamana:** Primarily pacifies aggravated *Pitta* and *Vata*.
- **Srotoshodhana:** Clears obstruction in channels (*Srotas*), restoring proper circulation.
- **Vedana Shamana:** Relieves pain and reduces swelling.
- **Rakta Prasadana:** Purifies blood and improves tissue nourishment (*Dhatu Poshana*).
- **Agni Deepana:** Enhances metabolic and digestive fire indirectly by reducing pathological burden.

Modern Biomedical Perspective

- **Mechanical Removal:** Direct removal of toxic, congested, or infected blood reduces local pressure and inflammatory load.
- **Anti-Inflammatory Effects:** Particularly in *Jalaukavacharana*, leech saliva contains bioactive compounds like hirudin (anticoagulant), calin (platelet aggregation inhibitor), and anti-inflammatory peptides.
- **Improved Microcirculation:** Relieves venous stasis and enhances tissue oxygenation.
- **Immunomodulation:** Alters cytokine profiles and reduces pro-inflammatory mediators such as TNF- α and IL-6.
- **Analgesia:** Natural anesthetic substances in leech saliva provide pain relief.

Samyak Lakshana (Signs of Proper Raktamokshana)¹⁹

- Reduction in pain, swelling, and redness.
- Improvement in local temperature and function.
- Subjective feeling of lightness and relief in the affected area.

Asamyak Lakshana (Signs of Improper or Excessive Bloodletting)²⁰

- Excessive bleeding
- Pallor and fatigue
- Dizziness or hypotension

- Local infection

ROLE OF RAKTAMOKSHANA BY JALAUKAVACHARANA²¹

Dushta Rakta Accumulation



Srotorodha (Obstruction in microchannels)



Local Symptoms:

- Pain
- Swelling
- Redness
- Skin discoloration
- Venous congestion



Application of Jalaukavacharana (Leech Therapy)



- Mechanical removal of vitiated Rakta
- Hirudin & other bioactive peptides act:
 - Anticoagulant action
 - Anti-inflammatory effects
 - Platelet aggregation inhibition
 - Fibrinolytic activity
 - Local anesthesia & analgesia



Srotoshodhana (Microchannel cleansing)



Therapeutic Outcomes:

- Reduction in pain & swelling
- Improved microcirculation
- Enhanced wound healing
- Restoration of Dosha balance
- Relief from chronic inflammatory & vascular disorders

RESULTS AND FINDINGS

Based on classical *Ayurvedic* references, clinical studies, and contemporary research, *Raktamokshana* by *Jalaukavacharana* has demonstrated significant therapeutic benefits in inflammatory and microcirculatory disorders. The key findings are summarized below:

1. Symptomatic Relief

- **Pain and Swelling:** Noticeable reduction in pain, edema, and local tenderness in conditions like varicose veins, arthritis, and chronic ulcers.
- **Skin Lesions:** Improvement in skin discoloration, texture, and healing of chronic non-healing wounds and ulcers.
- **Inflammation:** Significant reduction in local signs of inflammation, such as redness, heat, and stiffness.

2. Improvement in Microcirculation

- Enhanced blood flow and venous drainage observed clinically and confirmed by Doppler studies in varicose vein patients.
- Reduction in venous stasis and improved oxygenation of affected tissues.

3. Anti-inflammatory and Analgesic Effects

- Bioactive substances in leech saliva (hirudin, calin, eglins) contributed to decreased inflammatory markers (e.g., C-reactive protein, ESR).
- Patients reported substantial pain relief, often within the first few sittings.

4. Wound Healing

- Faster granulation and epithelialization in chronic ulcers and non-healing wounds.
- Decreased frequency of wound infection and improved healing outcomes.

5. Safety Profile

- *Jalaukavacharana* was generally safe when performed following classical and modern aseptic protocols.
- Minor transient side effects included itching or slight discomfort at the bite site.

- Serious complications (e.g., prolonged bleeding or infection) were rare and manageable with prompt care.

6. Patient Satisfaction

- High levels of patient satisfaction due to effective symptom control, reduced need for invasive procedures, and a holistic sense of relief.
- Many patients experienced not only local improvement but also systemic benefits such as reduced fatigue and enhanced mobility.

DISCUSSION

Raktamokshana, particularly by *Jalaukavacharana* (leech therapy), has been emphasized in *Ayurvedic* literature as a safe and effective means of managing *Rakta Dushti* and *Pitta-Vata* predominant disorders. Classical texts such as *Sushruta Samhita* elaborate on its indications in conditions involving blood stagnation, inflammation, and microchannel obstruction (*Srotorodha*). Modern clinical practice and research have confirmed these indications, especially in cases of varicose veins, venous ulcers, chronic inflammatory skin diseases, arthritis, and non-healing wounds. The gentle bloodletting by leeches, suitable even for delicate patients, offers a minimally invasive therapeutic option aligning with both classical wisdom and contemporary medical needs.²²

The therapeutic benefits observed in clinical studies can be attributed to the dual action of mechanical blood removal and the pharmacological properties of leech saliva. Bioactive compounds such as hirudin, calin, eglins, and hyaluronidase produce anticoagulant, anti-inflammatory, fibrinolytic, and analgesic effects. These agents not only enhance microcirculation and reduce local swelling but also modulate inflammatory cytokines, thus promoting healing. The *Ayurvedic* concepts of *Srotoshodhana* (channel cleansing), *Vedana Shamana* (pain relief), and *Rakta Prasadana* (blood purification) correspond well with these modern pharmacological mechanisms.²³

Clinical outcomes reported include significant relief from pain, reduction in swelling, improvement in skin lesions, and faster wound healing. Studies have also noted improvements in microvascular flow, enhanced tissue oxygenation, and a reduction in inflammatory markers like ESR and CRP. The safety profile of *Jalaukavacharana* is favorable, with rare adverse events when appropriate patient selection and aseptic protocols are

followed. Minor discomfort or transient bleeding is usually self-limiting and easily managed.²⁴

Despite the promising outcomes, there remain challenges such as variability in procedural techniques, limited large-scale randomized controlled trials, and the need for standardized treatment protocols. Further research integrating *Ayurvedic* diagnostic principles with modern clinical methodologies is essential to validate and expand the therapeutic applications of *Jalaukavacharana*. With growing interest in integrative medicine, *Raktamokshana* by *Jalaukavacharana* holds potential as an adjunct or alternative therapy for a range of inflammatory and microcirculatory disorders, offering a bridge between traditional wisdom and modern clinical practice.²⁵

CONCLUSION

Raktamokshana by *Jalaukavacharana* stands as a time-tested, safe, and effective *Ayurvedic* therapy for the management of inflammatory and microcirculatory disorders. Classical texts and modern clinical research both validate its utility in relieving pain, reducing swelling, improving blood flow, and promoting tissue healing in conditions such as varicose veins, chronic ulcers, arthritis, and dermatological disorders. The therapy achieves these benefits through the mechanical removal of vitiated blood and the pharmacological actions of leech saliva, which includes anticoagulant, anti-inflammatory, analgesic, and fibrinolytic effects. When performed following proper patient selection and aseptic protocols, *Jalaukavacharana* has shown excellent clinical outcomes with minimal adverse effects. Its integration into modern medical practice, supported by further high-quality research, offers promising potential for holistic and integrative management of complex inflammatory and vascular conditions.

CONFLICT OF INTEREST –NIL

SOURCE OF SUPPORT –NONE

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