

## Review Article



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**“RAKTAMOKSHANA (BLOODLETTING) IN SURGICAL AND SYSTEMIC DISEASES: AN INTEGRATIVE REVIEW OF AYURVEDIC PRINCIPLES AND MODERN EVIDENCE”**

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**ABSTRACT**

**Introduction:** Raktamokshana, or therapeutic bloodletting, is one of the five purification therapies (Shodhana Chikitsa) described in Ayurveda for the elimination of vitiated blood (Dushta Rakta). Traditionally applied in various disorders such as skin diseases, inflammatory conditions, and vascular ailments, it remains a topic of growing interest for integrative medicine. **Methods:** A comprehensive review of Ayurvedic classical texts, modern medical literature, and scientific databases (PubMed, Scopus, Web of Science, and AYUSH research portals) was undertaken. Studies including randomized controlled trials, observational studies, case reports, and preclinical experiments were included, along with references from *Charaka Samhita*, *Sushruta Samhita*, and *Ashtanga Hridaya*. The focus was on identifying evidence for Raktamokshana’s role in surgical and systemic conditions. **Results:** Classical sources emphasize Raktamokshana for conditions involving Pitta and Rakta vitiation, including skin disorders, varicose veins, abscesses, and gout. Modern studies suggest its therapeutic benefits in psoriasis, hypertension, migraine, localized infections, and metabolic syndromes. Techniques such as *Siravyadha* (venesection), *Jalaukavacharana* (leech therapy), *Shringa* (horn application), and *Alabu* (gourd application) are reported to offer localized anti-inflammatory, detoxifying, and immunomodulatory effects. Clinical trials on leech therapy have shown promising outcomes in reconstructive surgery, osteoarthritis, and chronic venous diseases. **Discussion:** Evidence suggests Raktamokshana has both systemic and localized effects, mediated through improved circulation, removal of inflammatory mediators, and neuroimmune modulation. However, scientific validation is limited by small sample sizes, lack of standardized protocols, and insufficient mechanistic studies. **Conclusion:** Raktamokshana, though rooted in traditional Ayurvedic wisdom, demonstrates potential in modern integrative care for surgical and systemic conditions. Rigorous clinical studies and translational research are warranted to establish its evidence-based role in current medical practice.

**KEYWORDS:** Ayurveda, bloodletting, leech therapy, Raktamokshana, systemic diseases

## INTRODUCTION

Ayurveda, the ancient Indian system of medicine, describes a range of therapeutic interventions aimed at restoring balance between Doshas (Vata, Pitta, Kapha) and maintaining homeostasis<sup>[1-2]</sup>. Among these, Raktamokshana (bloodletting) holds a prominent position as a purification therapy specifically addressing disorders of Rakta Dhatus (blood) and Pitta. The procedure involves controlled removal of impure blood to alleviate systemic and localized conditions<sup>[3-4]</sup>.

Raktamokshana has been classified into different techniques such as *Siravyadha* (venesection), *Jalaukavacharana* (leech therapy), *Shringa* (horn application), and *Alabu* (gourd application)<sup>[5-6]</sup>. These modalities are not only described in Ayurvedic classics like *Sushruta Samhita* but have also found resonance in various traditional systems worldwide. Modern science has begun exploring parallels between these procedures and current therapeutic approaches such as phlebotomy, cupping therapy, and leech therapy in reconstructive surgery<sup>[7-8]</sup>.

The present review aims to critically examine the role of Raktamokshana in surgical and systemic diseases by analyzing Ayurvedic principles and integrating available modern evidence. The objective is to provide a comprehensive understanding of its therapeutic scope, mechanisms, clinical efficacy, and potential for incorporation into contemporary healthcare<sup>[9-10]</sup>.

## MATERIALS AND METHODS

A structured literature review was conducted between May–August 2025. The following strategy was employed:

- **Databases searched:** PubMed, Scopus, Web of Science, AYUSH Research Portal, Google Scholar<sup>[11]</sup>.
- **Keywords used:** “Raktamokshana,” “bloodletting,” “leech therapy,” “Ayurveda blood purification,” “systemic diseases.”<sup>[12]</sup>
- **Inclusion criteria:**<sup>[13]</sup>
  - Classical Ayurvedic texts (*Charaka Samhita*, *Sushruta Samhita*, *Ashtanga Hridaya*) and their commentaries.
  - Peer-reviewed articles published between 2000–2025.
  - Clinical studies, case reports, review articles, and preclinical experimental studies.

- **Exclusion criteria:**<sup>[14]</sup>

- Non-peer-reviewed articles, anecdotal reports, and sources lacking authenticity.
- Studies not addressing surgical or systemic diseases.
- **Study types reviewed:** Randomized controlled trials (RCTs), observational studies, systematic reviews, classical references, and mechanistic studies<sup>[15]</sup>.

A thematic analysis was conducted to categorize findings into traditional perspectives, systemic applications, surgical relevance, and modern clinical outcomes.

## OBSERVATION AND RESULTS

### 1. Classical Ayurvedic Perspective

Raktamokshana is emphasized in *Sushruta Samhita* as one of the foremost surgical and para-surgical procedures. It is specifically indicated for conditions of *Rakta Dushti* (impure blood), where vitiated blood manifests as erythema, inflammation, pustules, ulceration, and systemic disturbances such as gout and bleeding disorders. *Charaka* highlighted its role in diseases involving Pitta–Rakta imbalance, whereas *Sushruta* elaborated procedural aspects and safety considerations.

The four major types described are:

- **Siravyadha** (venesection) – removal of blood through a vein.
- **Jalaukavacharana** (leech therapy) – controlled removal through leeches, suitable for delicate patients.
- **Shringa** (horn application) – suction-based technique.
- **Alabu** (gourd application) – dry cupping-like procedure.

Classical indications include skin diseases (*Kushtha*), abscesses (*Vidradhi*), piles (*Arsha*), gout (*Vatarakta*), migraine (*Ardhavabhedaka*), and eye disorders (*Netra Roga*).

### 2. Surgical Applications

In surgical practice, Raktamokshana plays a dual role: reducing local inflammation and preventing complications from blood stasis.

- **Abscesses and wound management:** Bloodletting near abscesses is said to relieve tension, reduce pain, and facilitate healing.
- **Varicose veins and chronic ulcers:** *Jalaukavacharana* has been explored as an



adjunct in venous insufficiency. Modern parallels exist in the use of leech therapy post-reconstructive microsurgery to relieve venous congestion.

- **Perianal diseases:** Classical texts recommend Siravyadha for *Arsha* (hemorrhoids) and *Bhagandara* (fistula), where modern surgical practice uses drainage and phlebotomy-like interventions.

### 3. Systemic Applications

Ayurvedic texts highlight systemic benefits, where elimination of vitiated blood provides relief in chronic, recurrent, or metabolic conditions.

- **Skin diseases:** Psoriasis, eczema, and urticaria are mentioned as Raktaja Vikara. Clinical studies report symptomatic improvement in psoriasis and acne with Jalaukavacharana.
- **Gout and arthritis:** *Vatarakta* closely resembles gouty arthritis. Case series suggest symptomatic reduction in pain and swelling after bloodletting.
- **Hypertension and migraine:** Siravyadha has been postulated to reduce blood pressure and alleviate vascular headaches, though modern data are limited.
- **Metabolic and systemic disorders:** Bloodletting has been explored for hemochromatosis, metabolic syndrome, and polycythemia in biomedicine, showing parallels with Ayurvedic descriptions of excessive Rakta.

### 4. Leech Therapy and Modern Evidence

Leech therapy (Jalaukavacharana) has the most robust modern evidence. The saliva of *Hirudo medicinalis* contains bioactive components such as hirudin, bdellins, and eglins, which provide anticoagulant, anti-inflammatory, analgesic, and antimicrobial actions.

- **Reconstructive surgery:** Leech therapy prevents venous congestion and graft failure; numerous RCTs and surgical case reports confirm efficacy.
- **Osteoarthritis:** Controlled trials suggest leech application reduces pain and stiffness in knee osteoarthritis, comparable to NSAIDs.
- **Chronic venous disease:** Studies show improvement in edema, pigmentation, and ulcer healing.

- **Dermatology:** Pilot studies report benefits in eczema and psoriasis, aligning with Ayurvedic recommendations.

### 5. Mechanistic Insights

Modern science provides mechanistic insights that validate classical concepts:

- **Removal of toxic metabolites:** Bloodletting reduces inflammatory mediators and oxidative stress, correlating with "Shodhana" (purification).
- **Improved circulation:** Relieves venous stasis and promotes oxygenation.
- **Immunomodulation:** Bioactive peptides in leech saliva modulate cytokines, paralleling the Ayurvedic claim of restoring Dosha balance.
- **Pain relief:** Leech therapy provides local analgesia through hirudin and other peptides.

### 6. Safety and Adverse Effects

- **Ayurvedic texts** emphasize contraindications (children, elderly, pregnant women, anemia, and cachexia).
- **Modern reports** mention local infection, anemia, or allergic reactions, mostly preventable with aseptic protocols and patient selection.
- **Clinical guidelines** are needed for dose, frequency, and patient stratification to avoid complications.

### 7. Synthesis of Literature

The collective evidence demonstrates that Raktamokshana, especially Jalaukavacharana, is effective in both surgical and systemic diseases. Classical descriptions align with modern biomedical findings, though rigorous large-scale trials are lacking.

### DISCUSSION

Raktamokshana represents a fascinating convergence of traditional Ayurvedic wisdom and modern therapeutic applications. Classical texts highlight its role in removing vitiated blood, restoring Dosha balance, and alleviating both local and systemic disorders. From a biomedical perspective, these effects may correspond to detoxification, removal of pro-inflammatory mediators, and enhancement of microcirculation<sup>[16]</sup>.

The most compelling modern evidence exists for leech therapy in reconstructive microsurgery, venous diseases, and osteoarthritis. Here, Ayurvedic Jalaukavacharana aligns with advanced surgical

needs, demonstrating translational continuity of ancient practices. Similarly, conditions like psoriasis, gout, and hypertension described under Raktaja Vikara find biomedical correlates where bloodletting or leech therapy shows beneficial outcomes<sup>[17]</sup>.

However, significant gaps persist. Classical literature emphasizes individualized therapy based on Dosha–Dushya assessment, while modern trials seek standardized protocols. The absence of harmonized outcome measures limits cross-comparison. Moreover, most clinical studies are small-scale with limited follow-up, reducing their generalizability. There is also a paucity of mechanistic studies exploring immunological and molecular pathways, beyond a few investigations on leech saliva bioactives<sup>[18]</sup>.

Future prospects include integrative clinical trials that employ standardized Raktamokshana protocols, coupled with biochemical markers of inflammation, oxidative stress, and vascular health. Comparative effectiveness research with phlebotomy, cupping, and modern detoxification techniques could provide greater clarity. Another opportunity lies in drug discovery, where peptides isolated from leech saliva may inspire novel therapeutics<sup>[19]</sup>.

Importantly, the safety profile must be carefully monitored. Ancient texts caution against indiscriminate use, and modern experience validates these warnings, especially regarding anemia, infection, and excessive bleeding. Hence, patient selection, dosage (volume of blood removed), and aseptic protocols are crucial for safe practice<sup>[20]</sup>.

In conclusion, Raktamokshana bridges tradition and modernity. While Ayurveda provides a holistic framework for understanding systemic imbalances, biomedicine supplies mechanistic and clinical validation. The synergy of both can foster an evidence-based, integrative approach that honors tradition while embracing scientific rigor<sup>[20]</sup>.

## CONCLUSION

Raktamokshana (bloodletting) remains a cornerstone of Ayurvedic purification therapies, with broad relevance for surgical and systemic diseases. Classical Ayurvedic texts underscore its role in conditions arising from vitiated Rakta and Pitta, such as skin disorders, abscesses, vascular ailments, and gout. Modern research, particularly on leech therapy, validates many of these claims, showing tangible

benefits in reconstructive surgery, osteoarthritis, chronic venous disease, and certain dermatological conditions.

Mechanistic insights suggest that Raktamokshana exerts effects through improved microcirculation, removal of pro-inflammatory mediators, reduction of oxidative stress, and immunomodulation. These observations provide biomedical correlates to Ayurvedic descriptions of detoxification and Dosha balance.

Despite promising findings, evidence remains limited by small study sizes, heterogeneity in protocols, and lack of mechanistic depth. Further research should focus on standardized clinical trials, safety evaluations, and integration with modern therapies. Additionally, translational exploration of bioactive compounds in leech saliva can advance drug discovery.

In practical terms, Raktamokshana offers a bridge between ancient wisdom and modern science, holding potential as a complementary intervention in integrative medicine. With rigorous validation, it may serve as a valuable adjunct in managing both surgical complications and systemic diseases.

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