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RESEARCH ARTICLE

JALAUKAVACHARANA: A CRITICAL REVIEW

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ABSTRACT

Ayurveda is an ancient system of medicine based on the belief that health and wellness depends on a delicate balance between mind, body and spirit. Ayurvedic modalities aim to restore balance of *Doshas*, which cause ailments, and preventing the recurrence of diseases by addressing underlying imbalances. *Raktamokshana* is one of these modalities which focuses on elimination of *Dushit Rakta* (vitiated blood) from one's body. Among various methods of *Raktamokshana*, *Jalaukavacharana* is practiced since ancient times. It holds a place in the right hand of Lord *Dhanwantri* emphasizing its significance for ailing humanity. The Father of Surgery, *Acharya Sushruta*, has given a detailed description of *Jalaukavacharana* in his treatise "*Sushruta Samhita*" and described *Jalauka* under the heading of *Anushastra*. The inborn attributes of *Jalauka* are *Sheeta* (cold) and *Madhura* (Sweet) are opposite to *Pitta Dosha* and these qualities help in pacifying *Pitta Dosha*. From a modern perspective, the saliva of *Jalauka* contains several bioactive substances which help in the removal of toxins accumulated in the body and thus helpful for the treatment of plastic and reconstructive surgery, which mainly helps to stimulate the growth of new blood vessels and restore the blood supply to compromised tissues. In addition to its medicinal properties, *Jalauka* is favored for being a minimally invasive and cost-effective treatment option.

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INTRODUCTION

According to *Acharya Sushruta*, *Rakta* (blood) is considered as *Chaturtha Dosha* with pathological and physiological roles, and responsible for the origin, existence, and destruction of the body¹. *Rakta Dhatu* is derived from its precursor known as *Rasa Dhatu* (plasma). The nutrients present in *Rasa Dhatu* and the components of the nutrient fluid, also known as *Ahara Rasa*, undergo a transformation within *Yakrita* (liver) and *Pleeha* (spleen) under the influence of *Ranjaka Pitta*, a specific type of *Pitta* responsible for producing color pigments. This transformation results in the formation of *Rakta Dhatu*². *Rakta Dhatu* plays a vital role in maintaining life by enhancing complexion, nourishing the muscular tissue (*Mamsa Dhatu*), and promoting cellular functions³. To eliminate vitiated *Rakta* (imbalanced or impure blood), a procedure called *Raktamokshana* (bloodletting) is performed. The term "*Raktamokshana*" is derived from the words "*Rakta*," meaning blood, and "*Mokshana*," meaning letting out. The process of *Raktamokshana* can be traced back to Vedic period. In the *Koushik Sutra* of *Atharvaveda* reference of *Raktamokshana* are available⁴. According to *Acharya Sushruta* and *Vagbhatt*, *Raktamokshana*, as a primary *Shodhana* therapy and a parasurgical method, holds greater significance than *Shaman Chikitsa* (palliative treatment) due to its ability to eliminate diseases at their root cause.

This purification treatment is particularly recommended for individuals such as monarchs, affluent individuals, children, the elderly, frightful, debilitated ladies, and those with delicate constitutions⁵. Among the five cardinal *Shodhana karmas* (purification actions), *Raktamokshana* is emphasized as a significant treatment in *Shalya Tantra* (surgical science). It involves two types of procedures: *Shastra Visravana*, which includes bloodletting through the use of sharp instruments like *Prachana* and *Siravedha*, and *Ashashtra Visravana*, which involves the use of non-sharp instruments or measures like *Jalauka* (Leeches), *Shringa* (horns), and *Alabu* (gourd). *Jalauka* (Leeches) are primarily used for disorders caused by imbalanced *Pittaja* and *Raktaja Doshas*. They offer a minimally invasive and cost-effective alternative to other surgical procedures. The saliva of Leech contains biologically active substances that possess anti-inflammatory, analgesic and anesthetic properties. These properties make Leech therapy beneficial in various disorders.

Importance of *Raktamokshana*: *Raktamokshana*, the ancient practice of bloodletting, holds great importance in traditional medicine systems. The blood, known as *Rakta*, serves as a vital medium for transporting metabolites, oxygen, and various ingested substances throughout the body. By removing any anomalies or imbalances in the blood, a wide range of issues can be addressed. The impact of *Raktamokshana* extends beyond simple blood purification, as it also helps prevent the manifestation of several ailments which

includes *Twak Doshas* (various skin disorders) *Granthi* (cysts and tumors) *Shopha* (inflammation) and *Raktaj rogas* like *Kushtha* and *Nilika*⁶. *Acharya Sushruta* further emphasizes the therapeutic benefits of *Raktamokshana*. This procedure not only assists in eliminating vitiated *Doshas* but also stands as the sole therapy capable of achieving such comprehensive results. *Acharya Charak* also highlights the positive impact of *Raktamokshana* on overall well-being. He suggests that individuals who undergo *Raktamokshana* at the right time experience increased happiness, enhanced sensory abilities, improved digestion (symbolized by the "fire igniting") and increased physical strength and longevity⁷. *Acharya Sharangdhara* says in case of emergency *Jalauka* can be applied even in contraindicated person for *Raktamokshana*⁸. The teachings of *Acharya Sushruta* and *Acharya Charak* also highlights the comprehensive and profound effects of *Raktamokshana*, making it an indispensable therapy for achieving overall well-being and combating specific diseases.

Precise time for *Raktamokshana*: The *Pitta Dosh* has a tendency to provoke and vitiate *Rakta* (blood) during the *Sharad* (autumn) season, making it an optimal time for *Raktamokshana*. *Acharya Sushruta* has provided further specifications regarding *Raktamokshana*, advising against performing it during extremely hot or cold seasons. It is recommended to administer *Raktamokshana* after appropriate *Swedana* and *Yavagu paan*⁹. In different seasons such as *Varsha Ritu* (monsoon season), it is advisable to perform *Raktamokshana* in *Vyabhra Kaala* (when sky is clear.) In *Greeshma Ritu* (summer season), the procedure is best conducted when it is *sheetal* (cool), while in *Hemant Ritu* (pre-winter season), it is recommended to perform *Raktamokshana* during the *Madhyaan* (afternoon)¹⁰.

Quantity of *Raktmokshana*

- According to *Acharya Charaka*¹¹-Before proceeding with *Raktamokshana*, it is essential to assess the potency and extent of *Dosha* imbalances as well as the specific location of *Rakta Dosh* (blood-related disorders). A thorough examination of the patient's condition should be conducted to determine the appropriate quantity of based on their strength, *Dosha* imbalances, and affected areas.
- According to *Acharya Sushruta*¹²-One *Prastha* is advocated as the maximum limit of bloodletting with excessively vitiated *Doshas*.
- As per *Dalhana*¹³

One (1) *Prastha* - *Uttamatra* (768ml approx)
Half (1/2) *Prastha* - *Madhyama* (384ml approx)
Onefourth (1/4) *Prastha* - *Hina matra* (192 ml approx)

- According to *Vridhd Vagbhatt*¹⁴ - During *Raktamokshana*, it is crucial to ensure that the quantity of bloodletting should not exceed One *Prastha*. It is essential to take into consideration the patient's strength, the severity of the disease, and the prevailing environmental conditions.
- According to *Vagbhatt*¹⁵-In a healthy person the quantity of bloodletting during *Raktamokshana* should not be greater than One *Prastha*.

Indications for *Raktamokshana*^{16,17}: The *Rakta-pittaj Vikaras* are *Mukhapaka* (erosion in oral cavity), *Akshiraga* (redness in eyes), *Puti Nasa* (foul smell sensation), *Asyagandhata* (smelly secretion from mouth), *Gulma* (inflammatory condition of abdomen), *Upkusha* (Bleeding gums), *Visarpa* (inflammatory skin disorders), *Raktapitta* (hemorrhagic disorders), *Prameelaka* (fatigue), *Vidradhi* (abscess), *Raktameha* (blood discharge with urine), *Pradara* (vaginal discharge), *Vatashonita* (gout), *Vaivarnya* (discoloration of skin), *Agnisada* (loss of appetite), *Pipasa* (excessive thirst), *Gurugatrata* (heaviness in body), *Santapa* (febrile condition), *Atidurbala* (excessive weakness), *Tikta Amla Udgara* (belching with bitter & acidic taste), *Klama* (unexplained fatigue), *Krodha Prachurya* (excessive explained anger), *Buddhi Sammoha* (confusion), *Lavan Asyata* (unreasonable excessive salty taste perception), *SwedaSharir Durgandhya* (excessive sweating with or

without foul odour), *Mada* (unreasonable compulsive behavior disorders), *Kampa* (tremors like pathological condition), *Swara Kshaya* (vocal intensity decreased), *Tandra* (unexplained mental fatigue), *Nidra Atiyoga* (excessive sleepiness), *Tamaas Atidarshana* (unexplained frequent blackouts), *Kandu* (itching), *Twaka Vikara* like *Kotha*, *Pidika*, *Kushtha*, *Charmadala* (skin disorders)¹⁶. *Raktamokshana* is indicated in *Gulma* (various gastrointestinal diseases) *Arsha*, *Vidradhi*, *Kushtha* (various skin diseases) *Vatrakta*, *Galamaya* (diseases of throat region), *Netra ruka* (eye pain, various diseases of eye) *Visha* (poisoning and other similar condition), etc.

Contraindications of *Raktamokshana*: *Sarvaanga Shotha* (individual with generalized edema), *Ksheenasya Amla Bhojana Nimitta* (individuals emaciated due to intake of sour food articles), *Pandu Rogi* (Anaemic Patient), *Arsha Rogi* (individual suffering hemorrhoids), *Udar Rogi* (individual with inflammatory disorders of abdomen organs), *Shosha Rogi* (individual suffering from disorders causing cachexia) *Garbhini* (pregnant ladies) and *Shyavathu* (individual suffering from inflammatory disorders)¹⁸.

***Jalauka*:** The importance of *Jalauka*, commonly known as Leech, in medical treatments has been recognized as a significant therapeutic modality for various disorders. The ancient sage of surgery, *Acharya Sushruta*, extensively described *Jalaukavacharana* in his renowned treatise "*Sushruta Samhita*," categorizing it under the section of *Anushastra*. *Jalauka*, or Leech, derive their life from water, hence the name "*Jalauka*," highlighting their aquatic nature¹⁹. *Acharya Sushruta* highlighted the inherent qualities of *Jalauka*, describing them as *Sheeta* (cold) and *Madhura* (sweet), which stand in opposition to *Pitta Dosh*²⁰. These distinctive attributes potentially contribute to the pacification of *Pitta Dosh*, making Leech therapy an intriguing therapeutic approach. Leech application, also referred to as *Hirudo* therapy or Leech therapy, has gained recognition in modern medicine as well. The classification of Leeches is based on their therapeutic roles. They are categorized into two main varieties: *Savisha Jalauka* (unfit for therapeutic purposes) and *Nirvisha Jalauka* (fit for therapeutic purposes). These varieties are further sub classified into six types each, allowing for a more specific selection of Leeches based on the intended therapeutic outcome.

Classification of *Jalauka*²¹: *Sushruta Samhita* describes morphological features of 12 types of Leeches as follows:

Nirvisha Jalauka (Non-poisonous Leech)²²

<i>Kapila</i>	These Leeches have their sides coloured like <i>Manashila</i> (realgar) and their dorsal surface are slimy and coloured like <i>Moonga</i> (green gram)
<i>Pingala</i>	These are slightly red or brown in colour, having <i>Vritakaya</i> and are <i>Aashughra</i> (move fast)
<i>Shankumukhi</i>	These are colored like <i>Yakritvarna</i> are <i>Sheeghrapaayni</i> (sucks fast) and have tapering mouth.
<i>Mushika</i>	These Leeches have their colour and shape similar to those of a <i>Mushika</i> (mouse) and possess an <i>Anishtha gandha</i> (disagreeable odour)
<i>Pundarikamukhi</i>	These are coloured like <i>Mudga</i> (Moong pulse) and have their mouth like <i>Pundreek</i> (lotus petals)
<i>Savarika</i>	These are coloured like <i>Padma Patra</i> and are of <i>Ashtaadash angula pramana</i> .

Savisha Jalauka (Poisonous Leech)²³

The following Leeches are indicated as poisonous and are not used for therapeutic purpose:

<i>Krushna</i>	Black like powder of <i>Anjana</i> (collyrium) and have broad head.
<i>Karbura</i>	Elongated like the <i>Varuni</i> fish, having cleft and elevated ventral surface.
<i>Alagarda</i>	These are <i>Romasha</i> (hairy), <i>Mahaparshava</i> (prominent sides) and <i>Krishnamukhi</i> (black mouth).
<i>Indrayudha</i>	Have raised linear marks and thus appear in variegated colours like those of a rainbow.
<i>Samudrika</i>	Slightly black and yellow in colour and are spotted, and possess the feature of an attractive flower.
<i>Gochandana</i>	These leeches appear to be divided in their hind part like the <i>Govrishana</i> (scrotum of a bull) and have <i>Anumukhi</i> (pin-point mouth)

Components of medicinal Leech saliva that exert effects in the host's body:²⁵

Hirudin	Inhibits blood coagulation by binding to thrombin.
Calin	Inhibits blood coagulation by blocking the binding of Von Willebr and factor to collagen. Inhibits collagen-mediated platelet aggregation.
Destabilase	Dissolves fibrin and has thrombolytic effect.
Hirustasin	Inhibits kallikrein, trypsin, chymotrypsin, neutrophilic cathepsin G.
Bdellins	Anti-inflammatory effect and inhibits trypsin, plasmin, acrosin.
Hyaluronidase	For penetration and diffusion of pharmacologically active substances into tissues especially in joint pain and has antibiotic properties.
Trypsin inhibitor	Inhibits proteolytic enzymes of host cells.
Eglins	Anti-inflammatory, Inhibit the activity of alpha-chymotrypsin, chymase, sub-stilisin, elastase, cathepsin G.
FactorXa inhibitor	Inhibits the activity of coagulation factor Xa by forming equimolar complexes.
Complement inhibitors	May possibly replace natural complement inhibitors if they are deficient.
Carboxypeptidase	An inhibitor increases the inflow of blood at the bite site.
Histamine like substances	A vasodilator increases the inflow of blood at the bite site.
Acetylcholine	Vasodilator

Mode of Action: Leeches have segmented bodies like that of an earthworm and have two suckers one at each end, caudal (back end) and rostral (front end). The mouth (front end) contains three jaws which can break the skin of the hosts to suck their blood and leave a Y shaped bite mark. There are two species of therapeutic medicinal Leeches-Hirudo medicinalis and Hirudo mychaelseni. In India, Hirudo medicinalis of Phylum-Annelida, class-Hirudinidae is used for *Raktamokshana*. These Leeches are dark brown in color and have six longitudinal stripes running along the body. Their bodies are 2 to 3 inches long, convex and wrinkled transversely, tapering at each end. During feeding it can suck around 5-15ml of blood²⁴. Hirudin is an anti-coagulant substance found in *Jalauka*. It inhibits conversion of fibrinogen to fibrin, thus prevents blood clotting. According to *Ayurveda*, *Jalauka* only ingest the impure portion of blood (*Ashuddha rakta*). We can suppose that deoxygenated blood drawn from superficial veins. Biologically active substances in Leech saliva helps the cells to absorb necessary nutrition and enable to remove toxins.

According to Modern science: Leeches secrete saliva that contains numerous bioactive substances with various properties, including anti-inflammatory, antibiotic, anti-platelet aggregation, and analgesic effects. Interestingly, researchers have found effective uses for Leech saliva and salivary gland extract in cancer and metastasis therapy, where they act as antimetastatic agents²⁶. Additionally, Leeches release a topical anesthetic when they bite, effectively masking any pain and rendering the host unconscious. It is worth noting that Leeches lack a conventional salivary gland instead, they possess salivary cells located in the pharyngeal region. These cells individually release their secretions through excretory ducts that have openings between the teeth on the dental ridge of the jaw, allowing the release of bioactive substances present in their saliva. By ingesting excess blood, Leeches aid in reducing tissue swelling and promoting healing. These microcirculatory actions facilitate the delivery of fresh oxygenated blood to the affected areas of the host until normal circulation is restored.

According to Ayurveda: In *Ayurvedic* texts, *Jalauka* (Leech) is described to have the potential mechanism of action of eliminating both vitiated *Doshas* and *Rakta*. While there are typically three *Sharira Doshas* (*Vata*, *Pitta*, and *Kapha*), *Rakta* (blood) is occasionally considered the fourth *Dosha* because the *Rakta Dhatu* is primarily responsible for vitiating *Pitta Dosha* throughout the entire body. This suggests that the metabolic waste carried by the circulatory fluid (*Rakta Dhatu*) could be the vitiated *Pitta Dhatu*²⁷. According to the *Ayurvedic* perspective, when *Rakta Dhatu* is expelled from the body through the use of *Jalauka*, it takes the vitiated *Pitta* with it. This process helps in cleansing the body. The mode of action of *Jalauka* is often summarized by comparing it to a swan that can selectively drink only the impure milk from a mixture of milk and water²⁸. The understanding is that the *Jalauka* sucks out and consumes the impure blood, which contains the vitiated *Pitta Dosha*. This action is believed to contribute to the purification and balancing of the body's *Doshas* and overall well-being, according to *Ayurveda*.

Samyaka Lakshana of Raktamokshana²⁹: The signs of properly administered *Raktamokshana* are *laghavam* (lightness), *Vedana shanty* (painsubside), *vyadhivegaparikshaya* (intensity of disease is reduced) and mental cheerfulness.

Ayoga and Atiyoga Raktamokshana Lakshna^{30,31}: *Shotha*, *Daha*, *Raga*, and *Paka* are the results of *Ayoga or Asmyaka Raktamokshana*, whereas *Ati Raktamokshana* is accountable for a number of situations, including *Siroabhitapa*, *Aandhya*, *Agnimantha*, *Timir*, *Dhatukshaya*, *Aakshepaka*, *Daha*, *Pakshaghata*, *Swasha*, *Kasa*, *Pandu*, and *Maran*.

Ayoga and Atiyoga Raktamokshana Chikitsa^{32,33}:

For *Asrava-Ela Karpura* and a number of other medications are combined with *Saindhav Lavana* and *Tila Taila*, and applied to the site of *Raktamokshana*. In contrast, *Atisrava's* use of drugs is documented in numerous classical texts together with *Lodhra*, *Yashtimadhu*, *Gairika*, *Sal*, *Sarjrasa*, *Arjuna*, etc. use of *Kshara*, *AgniKarma*, *Sheetajala Parisheka*, *Sheeta Pradeha*, *Raktapana Dugdha*, *Yusha*, and *Mansa*, as well as the renowned *Acharyas* also refer to *Rasa* for oral ingestion by the patient.

Precaution after Raktamokshana: Following a *Raktamokshana* procedure, it is advisable to refrain from consuming excessively hot or cold foods. This is because during this period, the *Dhatu* and *Doshas* in the body are in a state of instability. To safeguard the integrity of our *Rakta* and *Agni*, it is recommended to opt for *Laghu* (light) and *Agnideepak* (digestive-stimulating) foods³⁴. These types of nourishment assist in maintaining the balance of vital elements and promoting optimal digestion.

CONCLUSION

Leech therapy is widely acclaimed as the foremost and efficacious method of *Raktamokshana*, the ancient *Ayurvedic* practice of bloodletting. This unique therapeutic approach presents a non-invasive and incision-free means of purging vitiated "*Doshas*" from the body. Renowned for its revitalizing potential, Leech therapy has resurfaced as a novel treatment modality for a diverse range of persistent and potentially life-threatening ailments, including cardiovascular disorders, dermatological conditions, and infectious diseases.

Regarded for its remarkable efficacy, Leech therapy stands out as a secure and reliable means of eliminating *Dushit Rakta*, the impure or vitiated blood. *Jalaukavacharana* or Leech therapy, as elucidated by *Acharya Sushruta*, offers a promising approach in medical practice. The distinctive qualities of Leeches and their classification based on therapeutic roles provide a foundation for utilizing these remarkable creatures in the treatment of diverse ailments. Further exploration and research in this area hold potential for enhancing our understanding and application of Leech therapy in contemporary healthcare settings.

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