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## Fundamentals of *Jalaukavacharan* (Leech therapy) and its importance in clinical practice: A review article

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**Abstract**

*Ayurveda* is an ancient system of medicine based on Holistic concept of Health which depends on a balance between mind, body and spirit. *Acharya Sushruta* explain rakta as fourth *dosha*. *Raktamokshana* is the main and effective treatment of *Rakta* when it is being vitiated by *Pitta Dosha*. There are *Siravedh*, *Prachhan*, *Jalaukavacharan* etc. methods to do *Raktamokshana*. Among various methods of *Raktamokshana*, *Jalaukavacharan* is an ancient technique of bloodletting. *Acharya Sushruta* has given the detailed description of *Jalaukavacharan* in *Sushrutsamhita* and *Jalauka* under *Anushastras*. The inborn qualities of *Jalauka* are *Sheeta* and *Madhura* and opposite to *Pitta Dosha* and these helps to pacifying *Pitta Dosha*. According to modern science the saliva of the leech consists of anesthetic agents, anticoagulant, antiplatelet aggregation factor, antibiotic, anti-inflammatory substances, and gelatinous substances which helps in the removal of toxins accumulated in the body which mainly helps to stimulate the growth of new blood vessels and restores the blood supply. *Jalaukavacharan* is quite safe, effective, minimal expensive, easy process to do *Raktamokshana*. This paper discusses fundamentals of leech therapy and uniqueness and miscellaneous uses of *Jalaukavacharan* in various diseases in clinical practice.

**Keywords:** *Ayurveda*, *Raktamokshan*, *Jalaukavacharan*, leech, blood letting

**Introduction**

*Ayurveda* is one of the healing science with its main objective to maintain health which is balance between mind, body and spirit. In *Ayurveda*, primary aim is to balance the *Dosha*. Balance of *Dosha* is health and imbalance means illness.

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 body [1]. Since ancient time, *Raktamokshan* i.e., bloodletting is a parasurgical technique practiced worldwide. *Raktamokshan* 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-instruments or measures like *Jalauka*, *Shringa*, *Alabu* [2].

*Jalaukavacharana* is one among the bloodletting therapy which is used in *Atyanta Sukumaras*, *Twak Vikaras*, *Sthanik Rakta Dushti* etc. [3]. The very first documented evidence of *Jalaukavacharan* is found in *Sushruta Samhita*, written by *Acharya Sushruta*. *Pitta* and *Rakta* are having *Ashrayaashrayee Bhavas*. The main and best *Chikitsa* for *Pittaj Rogas* in *Raktamokshana* is *Jalaukavacharana* [4].

The word leech comes from an old English word 'laece' meaning 'physician'. The word later became Leech. In medieval England, leeches were linked with healing because of the etymology of the word [5]. Leeches are given the name *Jalauka* because the very basis of their life, the site of their dwelling, and the source of their nutrition is *Jala* i.e. water [6].

Ancient history suggest that Lord *Dhanwantary* evolve in this world after *Samudramanthan* with *Jalauka* along with pitcher filled nectar in his hand. This show immense significance of Leech in clinical practice [7].

Leeches are blood sucking invertebrate belonging to Phylum *Annelida*, Now a days Leech therapy has gained greater attention worldwide, because of its medicinal value. The saliva of Leech contains numerous biologically active substance, which have Anti-inflammatory, analgesic, anaesthetic properties as well as probable anti-oxidant effect [8].

So the present article provides concise knowledge about *Jalauka* and *Jalaukavacharan* (Leech therapy). The application of Leech therapy in different diseases has been reviewed in this article.

**Aim:** To do a literature based study of *Jalaukavachran* and its efficacy in different diseases in clinical practice.

**Objectives:** To study the indications, contraindications and complications of leech therapy.

To study details about *Savisha* and *Nirvisha Jalauka*.

Review the literature of recent researches about *Jalaukavacharan* (Leech Therapy).

## 2. Material and Methods

All data for this study is collected from ayurvedic literature viz. *Brihatrayi* and *Laghutrayi* and from some published articles related to Leech therapy.

**2.1 Ayurvedic Synonyms of *Jalauka*** <sup>[9]</sup>: Jalauka, Jalaragi, Jalayuki, Jaliasika, JalaJantuka, Veni, Jalaka, Jalookasa, Raktapayani, Rakta sandamshika, Vamini, Jalahjivani, Raktapata, Jaliasoochi, Jalatanou, Jalapatatmik, Jalika.

### 2.2 Importance of *Jalaukavacharan* in Ayurveda

The ancient sage of surgery, *Acharya Sushruta*, extensively described *Jalaukavacharana* in "*Sushruta Samhita*," *Sutrasthan* of 13<sup>th</sup> *Adhyaya* named "*Jalaukavacharniya*

*Adhayay*" is full of the scientific knowledge about leech and method of its application. Leech application is an easiest method of Bloodletting therapy. The diseases which cannot be cured by *Snehan & Swedan* can be cured by bloodletting and also controlled the recurrence. Leech therapy is a para surgical method of bloodletting. The condition where surgical management is not possible at that time parasurgical methods should be used.

### 2.3 Brief Review of *Jalauka*

The importance of *Jalauka*, commonly known as Leech, in medical treatments has been recognized as a significant therapeutic modality for various disorders. *Jalauka*, or Leech, derive their life from water, hence the name "*Jalauka*," highlighting their aquatic nature <sup>[10]</sup>. *Acharya Sushruta* highlighted the inherent qualities of *Jalauka*, describing them as *Sheeta* (cold) and *Madhura* (sweet), which stand in opposition to *Pitta Dosha* <sup>[11]</sup>.

### 2.4 Classification of *Jalauka*

<sup>[12]</sup>

The classification of Leeches is based on their therapeutic roles. They are categorized into two main varieties:

**Table 1:** *Nirvisha Jalauka* (Non-poisonous Leech) <sup>[13]</sup>

Kapila	These Leeches have their sides coloured like Manashila (realgar) and their dorsal surface are slimy and coloured like Mudga (green gram)
Pingala	Pingala exhibits a reddish-brown coloration and possesses a circular body morphology, displaying rapid locomotion.
Shankumukhi	It is characterised by a brown coloration resembling that of liver, a rapid blood-sucking ability, and a long, pointed mouth structure.
Mushika	It is characterised by its brown coloration and physical resemblance to mice with an unpleasant odour.
Pundarikamukhi	Characterised by a greenish hue akin to that of Mudga, and a wide aperture reminiscent of the lotus flower.
Savarika	Savarika is a reddish-pink coloured substance, possessing an oily texture and measuring eighteen angula (equivalent to 36 cms.) in length.

**Table 2:** *Savisha Jalauka* (Poisonous Leech) <sup>[14]</sup>

Krushna	It is having a dark complexion, resembling the colour of Anjana powder (Antimony) with large head.
Karbura	A grey coloration along with a broad body structure akin to that of Varmimatsya, a type of fish with segmented abdomen and appears to be bulging.
Alagarda	Exhibits hirsute characteristics with prominent lateral regions and a dark oral cavity.
Indrayudha	Exhibits distinctive stripes on their dorsal region.
Samudrika	Exhibits a blackish yellow coloration and displays intricate floral patterns on its body.
Gochandana	Exhibits a bifurcated lower region resembling the scrotum of a bull, accompanied by a diminutive oral aperture.

### 2.5 Zoological classification

**Kingdom:** Animalia.

**Phylum:** Annelida.

**Class:** Clitellata.

**Order:** Hirudinia.

**Family:** Hirudinidae.

**Genus:** Hirudo.

**Species:** *H. Medicinalis*.

### 2.6 Mode of Action of *Jalaukavacharan*

<sup>[15]</sup>

Leeches function by releasing bioactive compounds through their salivary secretions. The saliva comprises numerous components, that encompass an antiplatelet aggregation factor, anaesthetic, and anti-inflammatory and antibiotic agents. The saliva of leeches is known to possess hirudin, an

anticoagulant that effectively works on the process of blood clotting and facilitates the dissolution of thrombi. This mechanism helps in the clearance of both partial and complete blockages in distal arteries. Upon biting, leeches release certain chemicals in their saliva that have the ability to dilate the blood vessels of their hosts and reduce the viscosity of their blood. The act of secreting a local anaesthetic by leeches has the effect of masking any pain that may be caused by their bite, thereby rendering their hosts unaware of their presence. Leeches are known to promote healing and reduce tissue swelling by consuming excessive amounts of blood. The microcirculatory processes facilitate the delivery of newly oxygenated blood to the affected regions of the hosts prior to the reinstatement of regular circulation.

**Table 3:** Bioactive substances present in saliva of leech

No.	Constituent	Function
1.	Acetylcholine	Vasodilator
2.	Bdellins	Anti-inflammatory, inhibits plasmin, trypsin, and acrosin
3.	Calin	Inhibits blood coagulation by blocking the binding of Von Willebrand factor to collagen; inhibits collagen mediated platelet aggregation
4.	Carboxypeptidase-A	Increase the inflow of blood at the bite site of inhibitors
5.	Destabilase	Monomerizing activity; dissolves fibrin
6.	Eglins	Anti-inflammatory; inhibits the activity of $\alpha$ -chymotrypsin chymase, substilisin, elastase, and cathepsin G
7.	Factor Xa inhibitor	Inhibits the activity of coagulation factor Xa by forming equimolar complexes
8.	Hirudin	Inhibits blood coagulation by binding to thrombin
9.	Hirustatin	Inhibits kallikrein, trypsin, chymotrypsin, and neuropholic cathepsin G
10.	Histamine-like substances	Vasodilator
11.	Hyaluronidase	Increases intestinal viscosity and antibiotic action
12.	Tryptase inhibitor	Inhibits proteolytic enzymes of host mast cells

## 2.7 Method of *Jalaukavacharan*: (Leech Application)

### *Purva Karma* (Before procedure) [16]

**Preparation of patient:** First the patient is selected and his general health is examined. The patient who is curable by bloodletting treatment through leeches is selected.

Contraindicated conditions like Coagulating disorders (like haemophilia), anemia, diabetes, pregnancy, hepatitis, HIV patients should be ruled out.

### Preparation of Leeches

Fresh leeches are taken and a mixture of mustard and turmeric paste in water should be applied upon them which acts as disinfectant. After this the leeches should be transferred in another fresh water jar.

### *Pradhana karma* (Main Procedure) [17]

The patient should be made to sit or lie down and the desired site should be cleaned with water. Avoid soap or any antiseptic, as leeches are sensitive to odour they may not bite. The leeches should be hold at its neck and should be applied directly to the affected part. The leech when starts sucking the blood, elevates its neck assuming the shape of a horse shoe. Once leeches start sucking the blood, they should be covered with wet gauze and cold water should be poured on them from above time to time, so as to make the leeches comfortable during sucking. If leech refuses to stick to desired spot a small prick should be made at the affected site. If they do not stick even then, another one may be tried. The *Jalauka* (leech) first sucks only the vitiated blood from a mixture of vitiated and non-vitiated blood just like the swan sucks only milk from the mixture of milk and water. When itching or pricking pain is produced at the site of application it should be inferred that the leech is now sucking the pure blood (after having sucked the vitiated blood). When sucking pure blood leech should be removed. If it does not withdraw, a little turmeric powder or common salt powder should be sprinkled on the sucking part of the leech.

### *Paschata karma* (after procedure) [18]

- Patient care:** The site should be cleaned with normal saline and bandaging should be done after sprinkling turmeric powder to the bleeding site.
- Leech care:** After falling off, the leeches should be made to vomit. This is carried out by applying turmeric powder at their mouths. When the blood comes from the anterior sucker, gentle squeezing is required for proper emesis. If the leech is active when placed in water, it indicates that the vomiting is proper. The used leeches are kept in

separate jars/pots labelled with the details of the patient (name, OPD/IPD number, date of application etc.). The leech should be applied once in a week and one leech should be reserved for a particular patient to avoid cross infection.

### Leech Therapy and Infection Control

The complications of leech therapy, though considered rare, are blood loss necessitating blood transfusions and local bacterial infections mainly due to *Aeromonas hydrophilia* [19]. Various infection control strategies have been proposed to prevent nosocomial infections through leeches. Investigators attempted to disinfect the guts of leeches before they are applied on patients by placing them in 0.02% chlorhexidine for 15s or in antibiotic (tetracycline and cefoparazone) solutions for 12 hours [20].

### External decontamination of wild leeches [21]

External decontamination of wild leeches with 12.5 ppm hypochloric acid enables bacterial suppression. Also can prevent possible infections caused by contamination from leech oral flora and transport medium without causing negative effects on leech sucking function and life.

### 2.8 Precaution during leech application [22]

- BT and CT, HB%, Viral markers of patient should be normal.
- Gentle handling of leech.
- Cover the leech with wet gauze/ Cotton.

### 2.9 Complications of *Jalaukavacharana* [23]

Prolonged bleeding time, Bacterial infection, Allergic Reactions, Hypotension and Vasovagal attack, Fever, Local pain, Itching, ulcerative necrosis, local discomfort and itching etc.

### 2.10 Therapeutic Indication of *Jalaukavacharan* According to Classical Ayurvedic Text [24]

*Gulma.*  
*Arsha.*  
*Vidradhi.*  
*Kushtha.*  
*Vatarakta.*  
*Galroga.*  
*Netraroga.*  
*Vishavikara.*  
*Visarp.*

## Indications of *Jalaukavacharan* (Leech Therapy) other than classics

### Venous disease, varicose veins

Leech therapy has proven beneficial in the patients suffering from venous diseases [25]. Medicinal leech is effective treatment in the management of complicated varicose veins. It helps to heal ulcers, decreases the oedema and limb girth, and decreases hyperpigmentation [26]. Leeches have also been used after breast surgery to relieve the possible complication of venous congestion at the nipple [27]. Leeches used to treat post phlebitis syndrome in which venous valves are obliterated by deep vein thrombosis [28].

### Peripheral vascular diseases

Leech therapy is effective in management of Burger's disease as it relieves the inflammation and thrombosis. It gives fruitful results in other peripheral vascular diseases [29].

### Diabetic foot ulcer

The effectiveness of leech application in managing diabetic foot ulcers is notable [30].

### Non healing ulcer

The application of leech therapy in the treatment of non-healing ulcers has been very helpful in the relief of pain and acceleration of the healing process [31].

### Thrombosed Haemorrhoids

*Jalaukavacharana* (leech therapy) is very effective treatment in the management of thrombosed haemorrhoids. Pain, severe tenderness and bluish-black discolouration are the characteristic features of thrombosed pile mass. *Bdellin* present in the saliva of leech acts as anti-inflammatory agent thereby reducing inflammation maintains normal circulation and recovering discolouration. Anesthetic agent present in saliva of leech reduces pain and tenderness and giving symptomatic relief [32].

### Gout (Vatarakta)

Leech therapy is very useful in relieving pain, swelling, erythema in acute gout [33]. Leech application has significant role in treatment of Vatarakta. It reduces sandhishoola (Joint pain), Sandhishopha (Joint swelling), Sandhivaivarna (Erythema), and Sandhidaha (burning sensation at joint) [34].

### Vitiligo

Leech application along with Ayurvedic medication (*Arogyavardhinivati* 500 mg twice daily, *Guduchisatva* 500mg twice daily, *Haridrakhand* 6gm twice daily with normal water after food) is effective in preventing progression and inducing repigmentation of fast spreading vitiligo without any associated serious side-effects [35].

### Eczema

Bloodletting by making use of leeches is an effective, time saving, cost effective and acceptable treatment in skin diseases, especially in Eczema [36].

### Osteoarthritis

Leech therapy reduces knee osteoarthritis pain quickly and safely. Leech therapy is an easy, beneficial and safe treatment in symptomatic management of degenerative knee [37]. It helps by rapid reduction of pain associated with osteoarthritis of knee [38].

## Reconstructive plastic surgery

Leech therapy is a traditional treatment that is both safe and cost-effective. It is commonly employed in reconstructive plastic surgery to salvage reattached body parts and flaps, particularly in instances where blood circulatory issues are present [39].

### Reconstructive surgery

Leeches are being utilised by reconstructive surgeons to eliminate stagnant blood from a flap or reattached limb. In 1995, medicinal leeches were utilised to successfully reattach the ear of a five-year-old boy. Leeches have been utilised extensively for the purpose of reducing venous congestion in various body parts such as fingers, toes, ears, scalp, limbs, or other reattachments and replants following traumatic amputation [40-41].

### Tenosynovitis

Leech therapy is the best alternative therapy that can be used to treat tenosynovitis that surpasses the pharmacological treatment of tenosynovitis i.e. NSAIDs or corticosteroids [42].

### Keloids

In this study keloids treated with leech therapy show significant results [43].

Leech therapy also useful in Infectious diseases, Cardiovascular diseases, Cancer and metastasis, Diabetes mellitus and its complications, Dentistry, Audiology [44].

## Contraindications of *Jalaukavacharana*: (Leech Therapy) According to Ayurvedic classics [45]

*Sarvanga shoth*

*Udar roga*

*Shosha*

*Ksheena*

*Garbhini*

*Pandu*

## Contraindications of leech therapy in modern medicine [46]

Anticoagulant medications e. g. Warfarin.

Absolute haemophilia.

Severe anemia.

Erosive gastritis and potential GI bleeding.

Individuals with HIV infection.

Severe allergic diathesis [ Allergy to foreign proteins].

Hypotension.

Active tuberculosis.

Pregnancy.

Mental disorders during acute episodes.

Severely ill and bed ridden patients.

Extremely fearful patients.

## 3. Discussion

First documented evidence of the use of leech for medicinal purpose goes back to 200 BC. *Jalaukavacharana* comes under *Raktamokshana* in *Ayurveda*. It comes under *Ashastra* category. Wherever there is contraindication of *Shastra karma*, *Anushastras* like *Jalauka* can be used. It is one of the best parasurgical treatment modality for treating different medicosurgical conditions. Because of its safety and high efficacy, *Jalaukavacharan* (Leech therapy) is considered as a foremost therapy. It is used mainly in *Rakta* and *pitta doshaj vyadhi*.

The saliva of leeches contains a variety of bioactive substances such as hirudin, *bdellin*, *apyrase*, *eglin*,

destabilase, hyaluronidase which act as anti-coagulant, platelet anti-aggregate, anti-oxidant anti-radical, antibiotic. Bioactive agents in leech saliva having vasodilators, anesthetics and analgesic properties which are effective than topical analgesics and inflammatory agents are useful for managing inflammatory and degenerative joint conditions, such as gout and osteoarthritis. The anti-coagulation action of hirudin is beneficial in treating vascular disease, cardiovascular pathology, etc. Leeches are also proved effective in non-healing ulcers and diabetic foot ulcers. Now a days Leech therapy in the field of plastic and reconstructive surgery is found to be important due to the ease of leech application and reduced side-effects.

#### 4. Conclusion

*Jalaukavacharan* (Leech therapy) is very useful in many acute and chronic disorders. This unique therapeutic approach presents a non-invasive, incision-free, less time consuming cost effective and easily adopted for patients. It is very cheap and short procedure without obstructing patient's daily routine. Wherever there is contraindication of Shastrakarma Leech application is the best one because pre-surgery precautions like anaesthesia, antibiotics are not necessary.

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