



## JALAKAVACHARANA (HIRUDOTHERAPY): A UNIQUE PARA SURGICAL PROCEDURE: REVIEW ARTICLE

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**ABSTRACT-** *Raktamokshana* (bloodletting) is a parasurgical procedure directed for the treatment of *Raktajaroga* (blood-borne diseases) along with many surgical diseases. Among different types of *Raktamokshana*, Leech therapy is practiced since ancient time. *Acharaya Sushruta*, the Father of Surgery has devoted an entire chapter on *Jalaukavacharana* for the purpose of bloodletting. It is considered as most unique and most effective method of bloodletting. It is safely indicated in all mankind including the patients having poor threshold to pain. The important advantage of Leech therapy is that it may be advised on those areas of body where other methods of bloodletting like Venesection (*Siravedhan*), Cupping (*Ghatiyatra*) etc., are not possible. According to Ayurveda, *Jalauka* is used to expel out the vitiated blood safely, quickly and effectively. From modern perspective, the saliva of leech contains about hundred biological active substances. Leeches not only suck the impure blood but also leave behind their saliva, which contains enzymes that help to cure the disease. In present era, leech therapy has emerged as widely useful therapy in large number of diseases and is attracting the eyes of researchers all over the world.

**KEYWORDS:** *Raktamokshana*, Bloodletting, *Raktajaroga*, *Jalauka*, Leech therapy, Ayurveda.

### I. INTRODUCTION

The treatment of disease conditions with medicinal leeches is termed as Hirudotherapy (*Jalaukavacharana*). Hirudotherapy is one of the most ancient healing methods documented in the history of medicine. The first documented evidence of leeches is found in *Sushruta Samhita*, written by *Acharya Sushruta*. Leeches are propagated for therapeutic purpose (hirudiniculture). They are even grown on a mass scale, especially in France. 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. 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. Leech therapy played an important role during the seventeenth and eighteenth centuries, at which time it was used to cure a variety of ailments from gout to headaches. The use of leeches likely gained popularity among practitioner of phlebotomy due to its ability to achieve more gradual rate of blood loss. According to some, the therapy may have been so popular that leech shortages were reported in Europe during that time. Enthusiasm for leech therapy waned in the late nineteenth and early twentieth century, but the scientific interest in Hirudomedicinalis continued. In the early 1880s Haycraft first noted the antithrombotic properties of leech saliva and Jacoby discovered the anticoagulant factor in leech saliva and named it Hirudin in 1904. Hirudotherapy re-emerged as an adjunct to plastic, reconstructive, and, and trauma surgery in the 1970s and 1980s. As per Ayurveda, *Jalaukavacharana* is one of the procedures of *Raktamokshana* and *Acharya Sushruta* has described *Jalauka* under the heading of *Anushastra* (parasurgical procedures). It is considered as very effective method of *Raktamokshana* because here the vitiated '*Doshas*' are removed from the body without using any *Shastra* (cutting instrument).

### TYPES OF JALAUKA (LEECHES)

According to *Acharya Sushruta* *Jalauka* can be broadly classified into two groups

1) *Savisha* (Poisonous)

2) *Nirvisha* (Non-poisonous)

*Acharya Sushruta* has mentioned six poisonous and six non-poisonous strains of leeches. Not all

the strains of leeches mentioned by *Sushruta* are identifiable today.

### **Savisha (Poisonous Leeches)**

1 *Krishna*

2 *Karbura*

3 *Alagarda*

4 *Indrayudha*

5 *Saamudrika*

6 *Gochandana*

Leeches born in dirty water, born in areas where dead fish, frog and snake putrefy with their excreta, those which are red, white or very black in colour, which are over active, stout and slimy, those which have varied rainbow like lines on their back, are poisonous (*Savisha*) and should be rejected.

### **Nirvisha (Non-poisonous Leeches)**

1 *Kapila*

2 *Pingala*

3 *Shankumukhi*

4 *Mushika*

5 *Pundarikmukhi*

6 *Saavarika*

Leeches born in clean water are nonpoisonous (*Nirvisha*). They are bluish black in colour like algae, round (spindle shaped), their back is dark and belly is yellowish, they are slender.

### **INDICATIONS OF LEECH THERAPY (JALAUKAVACHARANA)**

During the middle ages, the golden era for bloodletting, leeches were used by almost all physicians to cure anything from gout to headaches, but now its use is restricted to certain centres for specific conditions. The world is coming back to leeches after the effects of leeching were clinically studied with evidence based documentation, especially in skin grafts refusing to take up and non-healing ulcers. In recent past years, various studies (clinical as well experimental) have been conducted globally to evaluate the efficacy of leech therapy in various ailments.

#### **Classical indications**

*Gulma* (abdominal lump)

*Arsha* (piles)

*Vidradhi* (abscess)

*Kustha* (skin diseases)

*Vatarakta* (gouty arthritis)

*Galroga* (throat disorders)

*Netraroga* (eye disorders)

*Vishavikara*

*Visarpa*

#### **Other indications**

- **Venous disease, varicose veins:** Leech therapy has been proven to help patients suffering from venous diseases. Medicinal leech is effective in the management of complicated varicose veins, it heals ulcer, decreases the oedema and limb girth, and decreases hyperpigmentation. Leeches have also been used after breast surgery to relieve the possible complication of venous congestion at the nipple. It is also used to treat post phlebitis syndrome in which venous valves are obliterated by deep vein thrombosis.
- **Peripheral vascular diseases:** Leech therapy can be effective in management of early stage of Burger's disease and other peripheral vascular diseases.
- **Diabetic foot ulcer:** Leech therapy is effective in the management of diabetic foot ulcer.
- **Non healing ulcer:** Leech application is significantly effective in pain management in the treatment of non-healing ulcers.
- **Thrombosed Haemorrhoids:** *Jalaukavacharana* (leech therapy) is very effective alternative treatment in the management of thrombosed haemorrhoids. Severe tenderness and bluish-black discoloration are the characteristic features of thrombosed pile mass. Bdelin present in the saliva of leech acts as anti-inflammatory agent thereby reducing inflammation maintains normal circulation and recovering discoloration. Anesthetic agent present in saliva of leech reduces pain and tenderness and giving symptomatic relief.
- **Arthrosis:** Leech therapy is an effective and safe treatment in symptomatic management of degenerative knee. It causes rapid reduction of pain associated with osteoarthritis of knee.
- **Gout (Vatarakta):** Leech therapy is effective in relieving pain, swelling, erythema in acute gout. Leech application has significant role in treatment of *Vatarakta*. It reduces *sandhisoola* (Joint pain), *Sandhishopha* (Joint swelling), *Sandhivaivarna* (Erythema), and *Sandhidaha* (burning sensation at joint).
- **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.
- **Vitiligo:** Leech application along with Ayurvedic medication (*Arogyavardhinivati* 500mg 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.
- **Eczema (Vicharchika):** Bloodletting by making use of leeches is an effective, time saving, affordable and acceptable treatment in skin diseases, especially in Eczema. *Jalaukavacharan* and *Nimbatail* application in *Vicharchika* is effective and statistically significant.
- **In Plastic and reconstructive surgery:** (Leeches historically used to remove vitiated blood are now used extensively by reconstructive surgeons needing to remove

stagnant blood from a flap or reattached limb): In 1985, medicinal leeches were used successfully to reattach the ear of a five year old boy.[27,28] Since then, leeches have been widely used to reduce venous congestion in fingers, toes, ears, and scalp reattachments, and replant, limbs or other body parts reattached after traumatic amputation.

#### CONTRAINDICATIONS OF LEECH THERAPY (JALAUKAVACHARANA)

Leech Therapy cannot be applied in all the patients and it is not recommended under the following medical conditions and diseases :-

- Absolute Hemophilia
- Anticoagulant medication eg. Warfarin, Heparin, Marcumar. (Aspirin and Clopidogrel are not contraindicated)
- Severe Anaemia
- Erosive gastritis and potential gastrointestinal bleeding
- During chemotherapy ( or people who are on immunosuppressive medication)
- Individuals with HIV infection
- Cachexia (of any cause)
- Severe allergic diathesis (allergy to foreign proteins)
- Hypotension
- Active tuberculosis
- Pregnancy
- Mental disorders during acute episodes.
- Severely ill and bed ridden patients
- Extremely fearful patient

#### METHOD OF COLLECTION AND PRESERVATION OF LEECHES

Leeches are collected from ponds/streams that contain lotus and spirogyra, with a piece of wet leather or meat piece. After collecting the leeches, they should be kept in large-sized pitcher (earthen pot) filled with water. Pulverized zoophytes and powder of dried meat and aquatic bulbs should be thrown into the pitcher for their food and blades of grass and leaves of water plants should be put into it for them to lie upon. The water should be changed every third day and feed should be dropped inside the pitcher. After seven days the pitcher should be changed i.e. the leeches should be transferred to a new pitcher at the end of every seven consecutive days. Now a days Leeches are purchased from companies that function as leech farms.

#### METHOD OF LEECH APPLICATION (JALAUKAVACHARANA)

##### ***Purva Karma (Before procedure)***

The patient who is curable by bloodletting treatment through leeches is selected. Coagulating disorders (like haemophilia), anemia, diabetes, pregnancy, hepatitis, HIV patients should be ruled out. Fresh leeches from the pitcher /tank should be taken and a mixture of mustard and turmeric paste in water should be applied upon them. One can observe that inactive leeches become highly active and run all around the

tray immediately after application of mustard and turmeric paste. After this the leeches should be transferred in another tray having clean water.

### **Pradhana karma (Main Procedure)**

The patient should be made to sit or lie down and the desired site should be cleaned with water but not with soap or any antiseptic, since leeches are odor sensitive and they may not bite. The leeches should be held 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. In the event of their refusing 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 nonvitiated 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. One can use a syringe to direct the leech to the desired site. Remove the plunger from a 5ml syringe, place the leech in the barrel of the syringe, and invert the barrel, holding the open end in place until the leech attaches and then gently withdraw the syringe.

### **Paschata karma (after procedure)**

The site should be cleaned with normal saline and bandaging should be done after sprinkling turmeric powder to the bleeding site. 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 from caudal to front end 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 labeled 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.

## II. MODE OF ACTION OF HIRUDOTHERAPY

The secretion of salivary glands of medicinal leech contains more than hundred bioactive substances which are responsible for carrying out the desired medical effect. The saliva of leech contains substances that anaesthetize the wound area making the bite of leech painless to its host and dilate blood vessels to increase blood flow to the site of bite. Secretions from the leeches salivary glands also contain anti-inflammatory, bacteriostatic and analgesic actions. The important constituents and their action are below:

- 1) **Hirudin** It is a powerful anticoagulant, it inhibit blood coagulation by preventing conversion of fibrinogen to fibrin.
- 2) **Hyaluronidase** It breaks down the hyaluronic acid. As a “spreading factor”, it opens the interstices, paving the way for other active substances in leech saliva to reach the deeper tissues. Hyaluronidase also possesses antibiotic property.
- 3) **Destabilase** Amonomerizing enzymes that dissolves fibrin (thrombolytic effect).
- 4) **Eglins** Are anti-inflammatory proteins. They inhibit the activity of alphachymotrypsin, chymase, subtilisin, and the neutrophilic proteinase elastase and cathepsin G.
- 5) **Calin** Inhibits blood coagulation by inhibition of collagen-mediated platelet aggregation and adhesion. It also inhibits von willebrand factor dependent platelet adhesion to collagen

**6) Tryptase inhibitors** Tryptase plays a key role in the pathogenesis of allergic and inflammatory reaction associated with impaired mast cell function. Trypsin is also involved in diseases such as asthma, rheumatoid arthritis and psoriasis.

**7) Hirustatin** Inhibits kallikrein, trypsin, chymotrypsin, and neutrophilic cathepsin G.

**8) Bdeleins** Anti-inflammatory, inhibits trypsin, plasmin, and acrosin.

**9) Factor Xa inhibitors** Inhibits the activity of coagulation factor Xa by forming equimolar complex (factor Xa catalyzes the conversion of prothrombin to thrombin during the process of blood coagulation)

**10) Acetylcholine** Vasodilator

**11) Histamine like substance** Vasodilator

**12) Carboxypeptidase A inhibitor**

Increases the inflow of blood at the site of bite.

### III. CONCLUSION

*Jalaukavacharana* is one of the important therapeutic procedures mentioned in Ayurveda to cure various ailments. It is a supreme therapy because of its safety and high efficacy in the disorders involving the vitiation of blood. Leech therapy has gained greater attention globally, because of its medicinal value and leeches are used successfully for many conditions. They are also very easy to handle and use. So it can be concluded that Hirudotherapy has been used to treat patients from the extreme antiquity and is still alive nowadays, and over the years the use of leeches have evolved from a simple bloodletting procedure into a scientifically based physiologic process with rational defined clinical applications.

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**Publication Ideology:** The University initiative behind this publication is to exhibit the uniqueness of the research work done in which both the students & teachers were actively involved where the teacher acted as the research mentor for the students to inculcate in them the research attitude. The highlight is that the work done is correlated with the ancient literature, invention, science & technology of ancient India.

**Correlation with Ancient Indian Literature:** Leech therapy is the application of medicinal leeches (*Hirudo medicinalis*) for therapeutic use. It is one of the oldest remedies, being employed by various medicinal practitioners. Leech therapy involves the attachment of cultured leeches onto the affected areas. Leech therapy involves an initial bite, which is usually a painless bite, followed by the sucking of 5 and 15 ml of blood. Its major therapeutic benefits are not only due to blood sucked during the biting, but also from the various bioactive substances, such as Hirudin, calin, Hyaluronidase, and Histamine-like substances, to name a few. Leech therapy has been employed in various disease conditions and surgical complications. It has been successfully used in plastic and reconstructive surgeries, cardiovascular complications, varicose veins, hemorrhoids and various joint ailments. Nowadays, it is also being utilized in gastrointestinal disorders, dermatology and gynecological abnormalities. More recently, Leech therapy has found new applications in cancer therapy, hypersensitivity conditions, like asthma, male/female sterility diabetes and acne vulgaris. Taking into consideration all the facts, Leech therapy efforts should be made in optimizing the success of medicinal leech therapy in clinical and private practice.

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