



## JALAUKA (LEECH)...THE PARA SURGICAL INSTRUMENT

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### ABSTRACT

*Panchkarma* is globally accepted and famous branch of Indian system of medicines i.e. *Ayurveda*. Raktamokshan has been described as a part of shodhan by Sushruta. Jalauka vacharan karma is the part of Raktamokshana .In present article an attempt has been made to enlighten the utility, types , structure and applied aspect for Jalauka. Jalauka can be cultivate and establish as anushstra, as the painless para surgical process. In present article types and the mode of action of Jalauka has been described as ayurvedic view as well as modern view are described.

**KEYWORDS:** *Raktamokshana. Jalauka, leech, Hirudin.*

### INTRODUCTION

Application of drug is not only given by orally, but also may others root of administration Viz. parentally, nasal, intrathecal, intradermal etc.

Leech therapy has no properties like Langhana, Pachana, though it expels out vitiated blood, very sharply from selected part of the body. So, Leech therapy (Jalauka vacharana) takes a pride of place in the list of Panchakarma like Shodhana Chikitsa from the sunrise of medical history. Acharya Sushruta has described Jalauka under the heading of Anushastra (Para sharp instrument)

In western science, 2 types of Leech have been expounded known as: aquatic and terrestrial. Out of these, according to Ayurvedic texture only one sort of Leech is found as a medicinal use, which exists in water.

Jalauka vacharana is claimed to be the supreme therapy because of its high effectiveness in the curing blood related disorders. It is much safe and less complicated natural process therefore indicated even for the king, rich, old, fearful, weak, women and the people of tender nature. There is a interesting quotation regarding promotion in utility of Jalauka

*kshetran grahanam jatih poshanam savacharanam  
Jalouksatcc yo vettee tatsadhyan sa jayed gadan.<sup>[1]</sup>*

"The clinician who knows all about the Leeches, habitat, their method of collection, varieties, storage and method

of application is successful in treating the disease amenable to them."

### History

Medicinal bloodletting has been practiced since the Stone Age.

Evil spirits were thought to cause illness and removal of these evil spirits required blood withdrawal. Records of the medical usage of leeches date back to the beginning of civilization.

Illustrations of leech application to patients were found in Egyptian tombs dating back to 1500 B.C. Chinese writings from the first century A.D. describe medicinal leeching. There are also references in Sanskrit, Persian, and Arabic literature.

The first Western documentation of therapeutic leech use is in the poem Alexipharmacata by Nicander of Colophon (200 - 130 B.C.). Galen (129 - 189 A.D.), the personal physician to Marcus Aurelius, advanced the practice of bloodletting through the development of his humoral concept of disease. The philosophy behind this disease concept was the balance of four humors (blood, phlegm, black and yellow bile) within the human body. Disruption of this balance led to disease. However, removal of the patient's blood would correct the humoral imbalance, thus restoring good health. The discovery that blood in the leech gut did not coagulate by John Haycraft in 1884 and the isolation of this anticoagulant, Hirudin, from leech pharyngeal glands by F. Markwardt in the late 1950s ensured the medical importance of the leech.

Scientific interest in leeches date back to ancient India. However, the first Western citation is credited to the Greek, Nicander of Colophon (130 BC). These early references were accounts of the use of leeches for bloodletting. This therapeutic use of leeches, the medicinal leech in particular, reached a height between 1825 and 1840. A more contemporary use of leeches was discovered in 1957 by Markwardt.

### Etymology

The term Jalauka can be split into Jala + Oka; i.e. water dwelling animals.

Jala + Oka = Jalauka

(Water) (Housing place)

Jala + Ayu = Jalayu

(Water) (Life)

The word Jalauka is a compound word with two components Jala + Oka; i.e. animals having water as its housing place.

The word Jalayu is a compound word with two components Jala + Ayu; i.e. animals having water as the life.

Considering both etymology, defines a creature of nature whose life and dwelling place is depends upon water (Jalam) called Jalauka.

### Definition

As per ref. of Sabda Kalpadruma,

“An aquatic feminine creature employed to expel out the vitiated blood.”<sup>[2]</sup>

As per ref. of Sushruta Samhita,

“A creature having its habitat and life as water.”<sup>[3]</sup>

### Synonyms

Jalauka is having various names which are –

Jalayuka Jalaua Jaluka Jalaluka

Jaalalauka Jalita Jaloka Jalauga

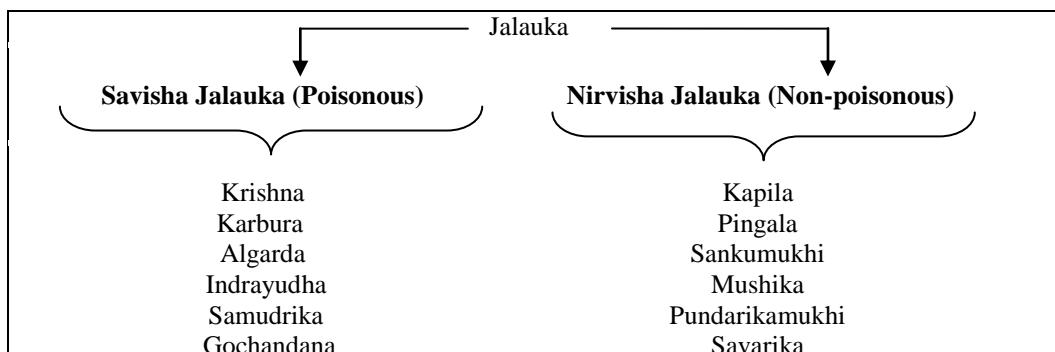
Jalatani Jalaukas Jalasuchi Jalaukasu

Jalasarpi Raktapata Ruktapa Rakta payini

Vanini Vedhini Venika Taleeq (Unani word)

### Classification

Regarding Jalauka, Acharya Sushruta has given foremost description with chapters in Sutrasthana. As per ref. all types of Jalauka may divided under broad heading with its varieties of Savisha & Nirvisha<sup>4</sup>, i.e. poisonous and non-poisonous. Each group contains 6 sub types of Jalauka.<sup>[5]</sup>



Savisha Jalauka (Poisonous)	Nirvisha Jalauka (Non-poisonous)
Originates in the decomposed urine and fecal matter of toads and poisonous fishes in ponds of stagnant and turbid water	Originates in decomposed vegetable matter, as the purified stems of the several aquatic plants known as Padma, Utpala, Nalina, Kumuda, Pundarika and common zoophytes, which live in clear water.
<b>General Characters</b> Thick in middle portion, while both ends are thin Slow locomotion Fatigues Middle part elongated Delay in sucking Not commendable type Sucks little quantity of blood.	<b>General Characters</b> Strong and large bodied Ready suckers Greedy (Mahashana) Saivala Shyava (Varna) Vrutta (round) Blue colored lining in dorsal side of the body, back side in Kashaya color.

Individual Features	Individual Features
1) <b>Krishna</b> Thickness Big head Resemble in black colours like Kajjala	1) <b>Kapila</b> Colour like Manahshila (real gar) at the sides Dorsal surfaces are slimy (Snigdha) and colored like Mudga pulse.

<b>2) Karbura</b> Ventral surface is convex (Ayata) where slight elevation or evation also placed. Resemble the fish of vermin type (Sarpakara)	<b>2) Pingala</b> Colour – Reddish or reddish brown Shape – Round Locomotion – Speedy (fast movement)
<b>3) Alagarda</b> Thick Hairy with wrinkles Both sided big and rounded Black at the mouth.	<b>3) Sankumukhi</b> Colour – blackish red like that of liver. Provided with the greatest swiftness. Sucks the blood fast, possess sharp and long suckers
<b>4) Indrayudha</b> Having different colours like rainbow. Number of linings on the body.	<b>4) Mushika</b> Colour & Shape – like the common blind moles Emit a foetid smell from the body.
<b>5) Samudrika</b> Blackish yellow with dotted skin and resembles many flowers	<b>5) Pundarikamukhi</b> Colour – like Mudga pulse (greenish black). Presence of resemblance of the mouth of the full blown lotus lilies (Posses broad mouth like a lotus flower)
<b>6) Gochandana</b> Narrow mouth Marked by bifurcating lines. Bottom (end Part) like the scrotal sac on a bull.	<b>6) Savarika</b> Marked with impressions like glossy lotus leaves. Measured eighteen fingers in length. Directed to apply only in the lower animals.

### Features of Savisha Jalauka Bite

If Savisha Jalauka is applied then a person suffers from following clinical symptoms:

Sushrut <sup>[6]</sup>	Ashtangasangraha <sup>[7]</sup>
1. Burning	Burning
2. Itching	Fever
3. Swelling	Inflammation
4. Drowsiness	Edema
5. Fever	Itching
6. Delirium	Boil
7. Unconsciousness	Erysipelas

Irresistible inclination to Vitiligo scratch the seat of bite.

### Vertigo

#### Treatment of Savisha Jalauka Bite

The bite of Indrayudha Jalauka is Asadhyा. The Venomous (Savish) Jalauka bite was considered as Mahagada and Pana, Lepana, Nasya etc. should be performed.<sup>[8]</sup>

**Female Jalauka:** Delicate, having thin skin, small sized head, the lower body being large.

**Male Jalauka:** Hard skin, big head along with being semi lunar in look with large front portion are male.

Female Jalaukas are advised in Alpa Dosha and acute disorders while the male Jalaukas are advised in highly vitiated Dosha and chronic diseases.<sup>[9]</sup>

According to Modern science, Leeches are divided in main 2 parts, Marine & certain fresh water leeches: which are devoid from jaws and have colourless blood. Terrestrial Leeches; which have 3 jaws and red coloured blood.

As regards the venomous and non-venomous, it is studies that leeches are neither poisonous nor are any definitely

known to be intermediate hosts of human parasites, but their habits make them potential carriers of infective agents.

There is a ref regarding the habitat of Jalauka, denoted that, which Leeches developed in polluted ponds having poisonous fishes and decomposed urine, fecal matter etc, are **poisonous** and Which Leeches originates in the purified water ponds having non-poisonous weeds and the leaves of flowering water plants like, lotus, algae etc are **non-poisons**. So no need of differentiation like Savisha and Nirvisha Jalauka.<sup>[10]</sup>

### 2. Nirvisha Jalauka

Nirvisha Jalauka originally grow in decomposed vegetable matter, as the purified stems of the several aquatic plants known as Padma, Utpala, Nalina, Kumuda, Pundarika and common zoophytes, which live in clear water.

### Availability

Since the time of Samhita, Jalaukas are available in Indian country at the sea-cost regions. As per the Sushruta Samhita's ref. habitat of Jalauka may seen in many parts of ancient India also.

Yavana (Turka sthana)

Pandaya (South region country – Deccan)

Sahya (Tract of land traversed by the Ghant Mountains)

Pautana (Modern time of Mathura) etc are the places for leech origination.

The medicinal leech is amphibious, needing both land and water. Generally, it founds from watery region, swims in sweet scented water, live in the dark and oozy beds and sucks blood from the affected part of a human or animal without causing any discomfort. It takes shelter under legs, stones, plants & other objects in shallow water, also in fresh water, ponds, lakes, tanks, swamps and sometimes still water standing in rice fields too.

## Leech

A leech is a worm like creature; it has been used for a long time and in different ways for medical purposes in Europe.

### Hirudo Medicinalis

Phylum	: Annelida
Class	: 3 - Hirudinea
Order	: H. limnobdella
Family	: Hirudinae
Genus	: Hirudinaria
Species	: H. medicinalis

### Phylum: Annelida

It includes the familiar leeches, earth worms and neries. Includes elongate, vermiform animal, whose body are divided into similar rings or segments.

This phylum includes the 500 species of leeches, flattened, predacious or parasitic annelids equipped with suckers used for creeping.

### Species: H. Medicinalis

#### External Features

##### Shape & size

- Leeches are small, soft, invertebrate vermiform = worm like structure
- Elongated, dorso-ventrally flattened,
- Almost cylindrical when contracted and ribbon shaped when extended
- 7 to 15 cm is length having 6 longitudinal reddish or brown strips.
- Broadest at near the posterior end & narrowest at near the anterior end
- Dorsal surface is somewhat convex and ventral surface is more or less plane
- Transverse outline almost oval.
- Dorsal surface brightly olive green and ventral surface is orange yellow or black & yellow.
- Black stripe marks on median longitudinal at dorsal side of the body.

#### Body surface (Segmentations)

Body of Leech is divided meta-merically in 33 true segmentations.

1<sup>st</sup> – 5<sup>th</sup> seg.: **Cephalic part:** includes mouth and eyes

6<sup>th</sup> - 8<sup>th</sup> seg.: **Pre-clitellar part:** bearing nephridiospores

9<sup>th</sup> – 11<sup>th</sup> seg: **Clitellar part:** temporarily clitellum develops during the breeding seasons around this region.

12<sup>th</sup> - 22nd seg.: **Middle part**

23<sup>rd</sup> – 27th seg.: **Caudal part:** mid dorsal oral aperture

28<sup>th</sup> – 33rd seg.: **Post-sucker part:** each represents by a single annulus.

Segments = somits = metameres

This one segment is further divided by closely set transverse grooves of furrows into about 95 rings (Annuli).

These segments may be distinguished externally at every 5<sup>th</sup> annuli, due to conspicuous pigments spots are larger than on the intervening rings, the annuli thus marked are the second of their respective segments. All these rings do not have internal counterparts and the annuli do not correspond to internal segments of the body. In the middle of the body, five annuli constitute one segment called somite. But on the anteriorly and posteriorly, there are fewer segments to each somite, and in some regions, a somite may contain a single annulus only.

Annuli surface is further divided into several more or less rectangular areas, the first annulus of each segment bearing a number of minute elevated sensory papilla, the annular receptors. 18 pairs of sensory papilla seated on both side of annulus. On the surface, 4 pairs of sensory papilla on dorsal side and 3 pairs on ventral side in the first annulus of each segment.

Out of these, large sensory papilla called the segmental receptors, and first annulus of every segment is known as segmental receptor organs or sensillae.

H. medicinalis has several pairs of testes and one pair of ovaries as well as a thickening of the body ring, known as a clitellum, which is visible during the breeding season.

The dorsal surface of anterior sucker contains 5 pairs of small black dots, recognized as a 'pairs of eyes'.

In 7<sup>th</sup> to 23<sup>rd</sup> segments, 17 pairs of excretory tubules or nephridia are presents. (Grzimek, 1974; Sawyer 1986)

#### Suckers

Hollow muscular organs on each end of the body are known as sucker.

##### (1) Anterior sucker ( Oral sucker) (Cephalic sucker)

Comprised of cup like hollow, pre oral chamber and the mouth It contains 3 jaws with sharply serrated edges, which are used like circular saws, and on them are about 100 horny teeth used to incise the host.

##### (2) Post sucker (Anal sucker)

It's highly muscular disc like structure, formed by fusion of 7 body segments (26th to 33rd).

#### Behavior

Leech swimming is produced by an anterior to posterior traveling wave of body undulation. The progressive movement of peaks and troughs along the animal's body is called a metachronal wave (see figure) whose cycle period varies according to swimming speed (350-2000ms.).

Interestingly, a single wavelength is generated at all swim speeds (cycle periods). It appears that a single wave in the body represents a compromise between thrust efficiency and stability. A larger thrust could be

generated with the body shaped into a half-wave; however, this waveform would lead to pitching of the head.

Thus, intersegmental delays in body movement vary with cycle period to maintain constant intersegmental phase lags near 20 degrees. Although sensory feedback from body wall movements help establish intersegmental phase lags. Mechanical properties of the hydroSkeleton and the hydrodynamics of the body provide the primary contribution to these motor phase lags. These swimming movements are the result of a central oscillator network.

### **Sysetemic information**

**Reproductive:** On the ventral surface in the clitellar region, occur two openings, besides the usual paired nephridiopores. These are unpaired apertures of which, the male genital aperture is situated in the 10th annuli, while the female genital aperture is situated in the 11th segment in the groove between the 2nd and 3rd annulus.

*H. medicinalis* breeds once during an annual season that spans June through August. It also remains fertile over a period of years, unlike most other leech species. The act of copulation takes place on land, where one leech attaches ventrally to one another by means of a mucus secretion.

All leeches are hermaphroditic (have both male and female reproductive organs) and fertilization is internal. Sperm is injected into the vagina by an extendable copulatory organ.

**Respiration:** Respiration takes place through the body wall, and a slow undulating movement observed in some leeches is said to assist gaseous exchange. Aquatic leeches tend to move to the surface when they find themselves in water of low oxygen content. As a fall in atmospheric pressure results in a small decrease in dissolved oxygen concentrations, rising leeches in a jar of water provided nineteenth century weather forecasters with a simple way of predicting bad weather.

**Feeding:** Most leeches are sanguivorous that is they feed as blood sucking parasites on preferred hosts. If the preferred food is not available most leeches will feed on other classes of host. Some feed on the blood of humans and other mammals, while others parasitise fish, frogs, turtles or birds. Some leeches will even take a meal from other sanguivorous leeches which may die after the attack.

Sanguivorous leeches can ingest several times their own weight in blood at one meal. After feeding the leech retires to a dark spot to digest its meal. Digestion is slow and this enables the leech to survive during very long fasting periods (up to several months).

**Digestive:** *Hirudo medicinalis* is parasitic and the adults feed on the blood of mammals. It attaches to the host by

means of its two suckers and bites through the skin of its victim. It has three jaws, which work back and forth during the feeding process, which usually lasts about 20 to 40 minutes and leaves a tripartite star-shaped scar on the host. Three jaws that look like little saws, and on them are about 100 horny teeth used to incise the host.

Young *Hirudo* feed on frogs and not mammals, since their jaws are not strong enough to cut through mammalian skin, while adults feed on mammalian blood.

Leeches only feed about once every six months; this is about how long the blood meal takes to be fully digested. Leech may even go longer than six months without food by digesting its own tissues. Bacteria that live within the leeches' body help keep the blood from decomposing. Sometimes, when blood is not easily available, it may go even longer on a fast, digesting its own tissues.

**Circulatory:** There is a tendency in this group toward the loss of true blood vessels. The blood of some leeches is red. In others the blood lacks oxygen-carrying pigments and is therefore colorless; the oxygen dissolved directly in the blood is sufficient for respiration. Gas exchange occurs through the body surface of most leeches, although many fish-parasitizing leeches have gills.

**Sense Organs:** Sensory organs on the head and body surface enable a leech to detect changes in light intensity, temperature, and vibration. Chemical receptors on the head provide a sense of smell and there may be one or more pairs of eyes. The number of eyes and their arrangement can be of some use in Identification, however to properly identify a leech, dissection is required.

The Rhyncobdellids are capable of dramatic colour changes, and although not an attempt at camouflage, the significance of this behaviour is unknown.

### **Chemical Constituents of Saliva**

The leech produces a number of important substances which contribute to the special property of the bite, including an anticoagulant, a local vasodilator and local anesthetic. Like Hirudin, Hyaluronidase, Hementin etc.<sup>[11]</sup>

Here therapeutic effect is not only released by loss of blood but also by the secretions which the leech emits in to the lesion. They secrete anticoagulants to prevent blood clots and relieve pressure due to pooling blood. Leech saliva helps reestablish blood flow to reattached body parts by means of a vasodilator, provides a numbing anesthetic, and lessens the risk of infection due to an antibiotic. These substances allow continued bleeding normally up to 10 hours after the animal has detached.

Research indicates that after about 3 to 5 days, new vessel ingrowths around flap margins develop sufficiently to restore effective venous drainage. Therefore, it is important that treatment is not terminated too soon, but rather, continued over a period of time to avoid failure. The property of the leech bite cut to continue bleeding, with encouragement, for 10 or more hours is related to pharmacologically active secretions (not the anticoagulant alone) introduced by the leech bite. The bite of the *Hirudo* is painless. It has an anesthetic that makes the bitten host feel nothing. Biologists are studying this substance in order to understand its chemical nature and mechanism of action.

**Hirudin:** It was recognized in the saliva of leeches in 1884. It was used in early transfusion experiments 30 years before Heparin was used. Since 1986, when Hirudin was genetically engineered, interest has been recharged in the drug as a systemic anti-coagulant free of some of heparin's side effects. It is also termed as anti-coagulin.

Hirudin – A 65 – residue anticoagulant complex protein prevents the clotting of blood by inhibiting the cleavage by thrombin of fibrinogen and a synthetic tripeptide substance. Thus, continuous bleeding from wound made by leeches occurs for a long time nearly 10 hours, even after the leech has detached itself.

It also works as diuretic and antibiotics. It keeps the wound opened for the approximately 30 minutes sucking act and keep the blood fluidly. Hirudin (mainly from leech) having approximately three times more anti-thrombin activity than pseudohirudin (mainly from leech whole body). (M. S. & D. Research Laboratory – Pensalvennia;).

The results of early clinical studies suggest that hirudin and hirulog may be more efficacious and more predictable and may have fewer bleeding complications than heparin for several clinical indications. (Paul H. Johnson, Ph.D. Cell and Molecular Biology Laboratory, Life Sciences Division, SRI International, Menlo Park, California 94025.).

**Calin:** It also prevents the blood coagulation. On comparison with hirudin it has a substantially longer times of period within which it is effective and takes cure of the 12 hours cleansing of the wound by a secondary haemorrhage.

**Destabilase:** It is endo-epsilon-(gamma-Glu)-lys isopeptidase protein from medicinal leech. It inhibits arterial thrombus formation in rats by inhibition of induced and spontaneous platelet aggregation And also reported that it also completely blocked the spontaneous aggregation of human platelet. It's orally action in experimental animal was reported as the hydrophobic properties, inhibition of platelet aggregation, protection from proteolysis and absorption from the intestine into

blood. It also ensures the protective antithrombotic effect. Almost total (80 – 100%) thrombolysis of preformed thrombus in the rat (Bio-dept. of M.S.U., Russia).

**A human blood plasma kallikrein inhibitor:** It is capable of blocking the amidolytic activity of the enzymes in an irreversible manner and also suppresses the kininogenesis activities of kallikrein (Article in Russia).

**Hyaluronidase:** An enzyme called hyaluronidase, which breaks down hyaluronic acid, the bonding material of connective tissue, thus fostering the flow of blood and fluids from affected areas. It is “spreading factors” that ensures that the other active substances which are active at the bitten areas can be spread. (Article in Russia).

Eglin restrains digestive proteasis. Bdellin is a plasma hindrance. They both have effects on the coagulation hindrance having different effective mechanisms together with Apyrase and Collagenase Furthermore, some of these substances having antiphlogistic, antibiotic and further characteristic (Article in Russia).

Antithrombin, antitrypsin and antichymotrypsin activities were found in the salivary gland secretion and intestinal chyme of medicinal leech. High antithrombine activity was maintained in starved leech. (Institute for zoo physiologic, Munster, Germany).

An anaesthetic substance leads to pain insensitivity (analgesic) when sucking or such pain killer chemical which stops you from feeling of bite.

Hementin and Orgelase have a hyperaemic effect but it is remained in limited leeches e.g. *Haementeria ghiliani*.

**Piavit:** It contains leech prostanoids and highly purified destabilase fraction. It has protective antithrombotic effects. ((Article in Russia).

The active leech substances totally block the enzymic process activated and often exceeding within inflammation or traumas.

The salivary glands of leeches also produce cornucopia of other pharmacologically active substance including an antihistaminic, protease and possibly, an anesthetic and antibiotic.

Mexican leech (*Haementeria officinalis*) contains antistatin (15-kDa protein) which provided anti-coagulant activity by inhibiting factor Xa an anti-metastatic agent. (M.S. & D. Research Laboratory – Pennsylvania – 19486).

#### Actions and medicinal uses

Actions and uses of leeches are detailed in the ‘Indian Materia Medica’ worked by K. M. Nadkarni. According to him leeches is antiphlogistic, used for the local

abstraction of blood and are also anticoagulants. Depletion by leeches is comparable to the abstraction of blood by venesection, by lancing or by moist cupping. The antiphlogistic action is slow. They make a limited or gradual local impression. They are used in acute inflammation of the local parts like glands, boils, sprains and blows, in inflammations of the serous membranes and in inflammation affecting the skin or bones.

In aggressive headache leeches are applied to the temples with benefit. In fevers with severe headache they are applied but only in the early stage of the disease; they are applied at the nape of the neck, if relief is not obtained by applying to the temporeles.

In severe pain in the chest or abdomen occurring during fever 8 to 10 leeches applied immediately over the seat of pain often afford manifest relief.

In acute dysentery a few leeches (6 to 9) to the margin of the anus are often helpful in relieving the pain and straining at stool.

The same measure is also useful in congestion of the liver, when placed over the region of the liver, and preferably at the margin of the anus.

Can leeches transmit disease? There is no evidence to suggest that they do. Allergy to leech bite has been reported. Medical opinion should be sought, depending on the severity of the reaction. The presence of

trypanosomes, (malarial parasites), in the gut of jawless leeches has been noted, but jawed leeches do not appear to be hosts.

A medicinal leech is a small “factory” on manufacture of biologically active substances on an alive organism is

- normalization and improvement of capillary circulation;
- expressed antiinflammation effect;
- antistressful and adaptogene effects;
- Blood purification effect by expel out the vitiated blood;
- immuno stimulation and immuno modulating effects;
- improvement of an endocellular exchage ;
- early wound healing effect;
- reduces the high blood pressure and blood viscosity;
- positive haemopoetic effect;
- anesthesia;
- anticoagulation;
- antibacterial effect;

#### **Indication**

Venous illness, acute phlebitis, varicose veins (Thrombo phlebitis, post thrombotic syndrome, phlebothrombosis), acute gout attack infections, otitis media, mastoiditis, glaucoma, angina pectoris, with thorough bred patient, high blood pressure and “praeapoplex” piles. Leech therapy is mainly practised in following medical conditions

Acne	Depression	Motor Neuron Disease
Alcoholism	Diabetes	Multiple Sclerosis
Allergies	Diarrhea	Muscular Dystrophy
Alzheimer Disease	Downs Syndrome	Narcolepsy
Ankylosing Spondylitis	Dysphasia	Osteoporosis
Anorexia Nervosa	Eczema	Ovarian Cancer
Arthritis	Endometriosis	Parkinson Disease
Rheumatoid	Epilepsy	Phobias
Asthma	Gallstones	Polio
Attention Deficit Hyperactivity Disorder	Gauchers Disease	Polycystic Ovary Syndrome
Autism	Genital Herpes	Polymyalgia Rheumatica
Back Pain	Genital Warts	Postnatal Depression
Bedwetting	Glucoma	Psoriasis
Benign Prostatic Hypertrophy	Gonorrhea	Post-traumatic Stress Disorder
Blepharospasm	Hemochromatosis	Rabies
Blindness	Hemophilia	Repetitive Strain Injury
Breast Cancer	Head Injury	Restless Legs
Bulimia	Heartburn	Rosacea
Cataracts	Hepatitis	Scabies
Cerebral Palsy	HIV	Schizophrenia
Cervical Cancer	Huntington Disease	Sinusitis
Chlamydia	Hypertension	Skin Cancer
Chronic Fatigue Syndrome	Impotence	Sleep Apnea
Cirrhosis	Indigestion	Systemic Lupus Erythematosus
Cleft Lip	Infertility	Spina Bifida
Cold Sores	Influenza	Stroke
Constipation	Insomnia	Suicide
Chronic Obstructive Pulmonary Disease	Legionnaire Disease	Testicular Cancer

Cot Death	Leukemia	Thrush
Crohns Disease	Lymphoma	Tinnitus
Cystic Fibrosis	Meniere Disease	Trichomonas
Cystitis	Meningitis	Tuberculosis
Deafness	Menopause	Ulcerative Colitis
Dementia	Migraine	West Nile Virus
		Whooping Cough

-(Dept. of Bio-Science,Columbia university,New York 10027 USA)

### Contra-Indication

It's easier to name contra-indications here: absolute-hemophilia, relative-pregnancy, anemia, hypotonic.

### CONCLUSION

In the words of Prof. Charles Lent, leading biologist of U.S., Leeches are useful in removing the blood from areas where tissue has been transplanted or reattached. Because when blood accumulates, tissue may die before it heals. Applying leeches to the area once of twice a day for a week give capillaries time to grow across sutures and restore blood circulation.

Though, we are able to substitute better coagulants than Hirudin, in the peak of medical innovations the importance of leeches are not washed out. Leech farms of medieval times are still under progress, growing millions of medicinal leeches from the developed ones like U.S.A.

The Carolina Biological Supply Co. in Burlington, N. C. is getting increased demand for the supply of leeches day by day from physicians all over the world indicating newer horizons of its utility in the coming days.

The words of Sushruta, are becoming a reality even after 2000 years of change of events that the physician having the art of leech application will be a successful once crossing the boundaries of time and space.

"The clinician who knows all about the leeches, habitat, and their method of collection, varieties, storage and method of application is successful in treating the diseases amenable to them" [Su. Su. 13/24].

### REFRANCES

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