

**ROLE OF LEECH THERAPY (HIRUDOTHERAPY) IN AYURVEDA: A SYSTEMATIC
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ABSTRACT

Leech therapy or Hirudotherapy was a prevalent sort of therapy in various ailments. The famous novel Ayurveda text Sushruta Samhita devoted an entire chapter on hirudino therapy. Leech therapy are often correlated to Jaloukavacharana in Ayurveda, which is that the best tool of Raktamokshana curing many diseases like abscess, cysts, tumors and blood borne diseases. It is a parasurgical procedure which may be applied in children, delicate people, ladies, and in those that are scared of surgery. It is a safer and fewer complicated natural action consistent with Ayurvedic documents. Leech has also been widely applied in neurophysiological and developmental genetic studies and thought of together of the simplest laboratory model organisms for toxicological, physiological, biochemical and histological studies. Leeches suck the surplus blood, reduce the swelling within the tissues, and promote healing by allowing fresh oxygenated blood to succeed in the world until normal circulation are often restored. This text elaborates the indications, contraindications, sorts of leeches, procedures of leech therapy and throws light on the mechanism of action of leech. This paper summarizes the varied aspects of the role of *Hirudo medicinalis* therapy in Ayurveda.

KEYWORDS: Hirudotherapy, Sushruta Samhita, Ayurveda, Raktamokshana.**INTRODUCTION**

Leech therapy is one among the oldest minor invasive method in medicine that was already mentioned 1,500 BC in Egypt. Sanskrit writings described leech therapy from 1,300 BC.^[1] The word "leech may be a derivation of the AngloSaxon loece, meaning "to heal." Hirudotherapy (Leech therapy) is one among the oldest practices in medicine and it's known from the time of utmost antiquity and remains alive. The leech was utilized in medicine as a way of "local depletion" (bloodletting) from the traditional days of Greece, Rome and Arabia. Through the 19th century leeching was frequently practiced in Europe, Asia and America to deplete the body of quantities of blood, during a manner almost like bloodletting. In the ancient time, leeches were merely used as a tool for bloodletting. During the center ages, leeches weren't viewed as a crucial organism for therapy. However, within the 18 and 19 centuries, leeching was at its peak of recognition in Europe thus, leading to leeches becoming a serious object of International trade. Today, however, leeching is resorted to only once in a while to revive blood flow to areas of damaged veins after an appendage has been reattached or a tissue grafted. The leeches are used for a variety of medical purposes including treatments for arthritis,

blood-clotting disorders, varicose veins and other circulatory disorders. This method has been widely applied in neurophysiological and developmental genetic studies and thought of together of the simplest laboratory model organisms for toxicological, physiological, biochemical and histological studies. One among the foremost exploited *Hirudo medicinalis*, collected from rivers and ponds is medicinal leech, whose bloodsucking capabilities once made it a valuable commercial item.^[2] The earliest known fact was that leeches prey on the blood of their host (phlebotomy) and through the course, release pain-killing (anesthetic) and blood-thinning substances (anticoagulants) from their saliva. Bioactive compounds like hyaluronidase and collagenase secreted through the leech saliva help open the host tissue upon biting. In recent years, medical leech therapy has gained increasing interest in plastic surgery and pain management and other medical fields. Many studies are currently under progress to evaluate its effects, mainly within the treatment of pain. In many countries like Europe and US, thousands of patients are healed using leech therapy. Many traditional medical systems, for instance, the Greek, Arab and Russian, mention leech usage. The origins of traditional Indian medicine Ayurveda remain unclear, but it's said so far back some

3000 years. Leech therapy has been a lively part of traditional Indian medicine throughout its history. Since past, leeches are historically documented in our literature and are recognized as both, a parasite and a therapeutic agent. This species survives well in temperate climates and muddy freshwater pools where weed growth acts as their natural habitat. They are sanguivorous or blood-sucking annelid worms which have gained popularity not only within the field of life science, but also in dentistry. Their use had been practiced over the past in almost every region of the planet. Different species of medicinal leeches are popular, among which, the foremost commonly known is that the medicinal leech, a water hermaphrodite, also referred to as the European Medical Leech. Other *Hirudo* species that were sometimes used as medicinal leeches are *H. orientalis*, *H. troctina*, *H. verbana*, *H. manillensis* or the Asian Medical Leech as *Hirudinaria granulosa*. Beside these *Macrobodella decora* or the North American Medical Leech is additionally used. It possesses a singular ability to get rid of blood by using their proboscis to puncture through the skin and simultaneously release an anaesthetic to eliminate pain of the bite inflicted. Salivary components are released which prevent the blood from clotting and permit maintenance of the blood-thinning substances (anticoagulants) procedure. Medicinal uses of leech application (jalukacharana) is practiced globally, since ancient days. Detailed descriptions regarding leech therapy is out there in Sushruta Samhita and also in Ayurveda and Sri Lankan tradition medical books, physicians.^[3] As stated by Ayurveda, these diseases are caused by vitiation of three dosha. Leech application (jalaukacharana) may be a sort of bloodletting therapy (raktamokshana) which may be a procedure of panchakarma, helps to eliminate vitiated dosha and toxins that accumulate within the body.^[4] In Ayurveda system of drugs Raktamokshana Karma (bloodletting) is taken into account as a regimental therapy. Moreover, this procedure is essential to adopt in autumn season for purification of body humors. Raktamokshana is additionally indicated in treatment of Raktaja Roga (diseases caused by or affecting the tissues of blood). The 2 sorts of Raktamokshana are Pracchana Karma (scrapping or scarification) (PK) and Siravedha Karma (vein puncture) (SK). However, the other methods of Raktamokshana for delicate patients is Jaloka Avacharana (medical leech therapy [MLT] or hirudotherapy). In Ayurveda text the Jaloka (leeches) has been classified in two major varieties supported their therapeutic role, the Savisha (unfit for therapeutic purposes) and Nirvisha (fit for therapeutic purposes). The Jaloka for therapeutic purposes were collected from water ponds using piece of wet leather or fresh meat. Wide and new earthen pots were used for preserving collected Jaloka, having clean water in pots.^[5] Leech therapy is taken into account as supreme therapy due to its high efficiency in curing blood related disorders. This natural process is regarded to be safer and has fewer complications during treatment.

RESULTS

Importance of Leech Therapy

Sushruta's proclamations are getting reality even after 2000 years of change of events that "The clinician who knows well about the leeches, habitat, their method of collection, varieties, storage and method of application is successful in treating the diseases amenable to them". Both Sushruta and Vagbhata included leech under Anushastra. Charak considered it is as one of the Shastra Pranidhana. Sharanghadhara says just in case of emergency, leech are often applied even in contraindicated persons for Raktamokshana. Leech sucks the impure (Dushta) Rakta from the mixture of Dushta and Shuddha Rakta like Hams (Swan) drinks milk from a mix milk and water. Prof. Charles Lent, leading biologist of U.S. said that, leeches are useful in removing the blood from areas where tissue has been transplanted or reattached, The Carolina Biological Supply Co. in Burlington, N.C. is getting increased demand for the availability of leeches day by day from physicians all over the world indicating newer horizons of its utility within the coming days. Modern hirudotherapy differs from that of ancient one because now we don't use wild leeches but grown during a special bio factories where they're in severe quarantine. In western science, 2 sorts of Leech are expounded known as: aquatic and terrestrial. Out of these, consistent with Ayurvedic texts just one sort of Leech is employed for therapy, which exists in water.^[6] A leech ingests several times its own weight of blood at one meal which will sufficient for several months. Some leeches are capable of ingesting up to nine fold their weight, which can represent a whole year's nourishment.^[7] With span of your time, physicians employed these spineless blood-sucking animals as a remedy for an outsized number of diseases and deformities, from congested limbs to the treatment of varied eye diseases. Only the leeches, which are grown in farms and which have undergone strict quarantine, are employed for the therapy. As leech therapy is exclusive treatment procedure for various diseases. The supply of leeches is a challenge for Ayurveda fraternity.^[8] A leech is employed for one treatment and wild leeches aren't used anymore. It provides double benefit, first remove the impure blood and second to inject the beneficial bioactive chemicals in human blood streams.^[9] Leeches are colonized by endosymbiotic bacteria, mostly *Aeromonas* species that helps within the digestion of blood within their gastrointestinal system.^[10] Contemporary leech therapy is most frequently utilized in the setting of localized venous congestion or hematoma.^[11] Reports of hirudotherapy within the setting of sentimental tissue hematomas include leech applications for giant scrotal and lingual hematomas.^[12]

Leech: Biology, its types

Leeches are usually hermaphrodite, but each copulates with another individual. Many leeches prey on other small invertebrates, but others are blood-sucking parasites that feed by attaching temporarily to other animals, including humans. Many blood-sucking species are highly

discriminating, feeding readily on blood from some species but not others. Some parasitic species use blade-like jaws to slit the skin of the host, whereas others secrete enzymes that digest a hole through the skin.^[13] The name medicinal leech, assigned by Linnaeus in 1758, reveals an extended association with human use.^[14] Leeches are annelid without an exoskeleton, the *Hirudo medicinalis* may be a very specialized annelid both anatomically and behaviorally.^[15,16] Leech consists of 102 annuli, each of which usually consists of 5 segments.^[17] Leeches vary from terrestrial, marine, land to aquatic type. Some are found in soil, some in flowing water. Leeches are generally small and range from 10 to fifteen cm long. But adult specimen could also be 30 to 35 cm long. The ectoparasite, leech home in size from tiny species that are 5 mm long to varieties like *Haemopsis*, which are reported to be as long as 45 cm when extended and swimming. The body of the leech is brightly coloured with characteristic markings and therefore the dorsal surface is green. Leeches are often differentiated on the idea of their feeding patterns, preferring blood from certain species.^[18] The feeding behavior of medicinal leech is controlled predominantly by the neurotransmitter serotonin which is abundant within the largest neuronal cell of the leech, the Retzius cell.^[19,20] The actual act of feeding is stimulated by the proximity of mammalian-range temperature and by the sodium and arginine in blood.^[21] Around 650 species of leeches is found worldwide. Many of the species of leech has now become endangered and has been categorized under red list due to indiscriminate use in medical field. In traditional Indian medicine, leeches are classified into poisonous and nonpoisonous types, counting on their toxicity. The adverse effect of poisonous leeches can cause swelling and itching within the bitten area, also as fainting, fever, burning sensations, vomiting, intoxication and myalgia. The utilization of nonpoisonous leeches causes no complications during bloodletting. In India, Phylum- Annelida, class- Hirudinea, medicinal leech are used for bloodletting. These leeches are dark in color and marked with 6 longitudinal stripes. Their bodies are 2 to three inches long, convex and wrinkled transversely, tapering at each end. These leeches are classified into 12 types, with each type bearing Sanskrit names.^[22]

Ayurvedic Classification of leech

Sustruta Samhita described 12 sorts of leeches and classified them into 2 main categories: Non-poisonous leeches (nirvisha jaluka) and Poisonous leeches (savisha jaluka). Six sorts of leeches included under the group of Non-poisonous leeches are Kapila, Pingala, Shankamukhi, Mushika, Pundarikamukhi and Savarika while Krushna, Karbura, Alagarda, Indrayudha, Samudrika and Gochandana are categorized under Poisonous leeches.^[23] Jala and ayu means 'the animals having water as life'. Leeches also are referred to as Jalayuka. This word also comprises of two words jala and ayuka which suggests 'one who survive only in water'.^[24]

Rearing of Leech

The best season for collection of leeches are autumn and winter season. Leeches were kept in water in a big jar, and were regularly fed with algae and powdered dried meat of aquatic animals. Placing straw and aquatic plants in these jars helps create an appropriate environment. The water should be changed, and therefore the food residue cleaned after every 3 days. Transferring the leeches to a different jar, once every week, also appears beneficial. Leech are often caught from ponds, streaming water with the assistance of fresh meat or with wet piece of leather. It is then stored in dense earthen pots having water and is feed by leaf of lotus plants. The pot should be changed after every 7 days properly.

Procedure (Vidhi) of Leech Therapy

Leech therapy is a treatment that is performed by using *Hirudo medicinalis*. The ministry of health protection of Russia approves this type of therapy.^[25] Leech therapy has following steps: Purvakarma, Pradhana Karma and Paschatkarma.^[26] Purvakarma includes collection of leeches, preservation of leeches, preparation of leeches and preparation of patient.^[27] Pradhana Karma involves application of leech and their further observation. Paschatkarma includes care of both leech and patient.^[28]

1. **Pre-leeching procedure** involving collection of leeches, preservation of leeches and selection of suitable patient.
2. **Leeching Procedure Proper.**
3. **Post-leeching Procedure** involving separation of leech, vomiting of leech and control of bleeding.^[29]

It includes collection of leeches, preservation of leeches, preparation of leeches and preparation of patient. The leeches were caught from a bit of fresh meat or with wet weather from ponds, streaming water and tanks. After collecting the leeches, they were kept in wide and new earthen pots. Water should be filled into the pot regularly. Leeches should be taken out of pot and pasted with seed of mustard and turmeric. Then about 48 min. they ought to be kept in pot filled with turmeric water till they regain the natural cheerfulness and freshness and free from natural urges. Then leech should be applied to the affected part. Leech should be applied after cleaning of the affected spare cotton gauze to get rid of superficial dead skin.^[30]

Mechanism of Action

Leech therapy works on the principles of Evacuation of morbid humours and Diversion of humours. Evacuation of morbid humours means the resolution and excretion of morbid humors and excess fluids from the body, thereby maintaining the homeostasis within the quality and quantity of 4 body humors, which is really liable for the upkeep of normal health.^[31] Diversion of humours refers to the diversion of the morbid fluids from the location of affected organ to the location from where it is easily expelled out from the body tissues. Supported this holistic approach, Unani physicians are widely using this therapeutic regimen for variety of diseases.^[32] The

effectiveness of this therapy can also be attributed to the sedative and anti-inflammatory actions of saliva of leeches. The saliva of leech contain hirudin, calin, destabilize, hyaluronidase, hementin, orgelase and piavit.^[33] Moreover, the saliva of leech contains about 100 pharmacologically active biological substances which contribute to the special property of leech. These include anticoagulants like hirudin, calin, inhibitors of kallikrein, hayaluronidase, histamine-like vasodilators, collagenase, and poorly characterized anaesthetic and analgesic compounds.^[34] Through veins, the biologically active substances act on organ during sucking by leech. It promotes the development of blood circulation within the organ, renders thrombolytic, anti-inflammatory and immuno-stimulant action.^[35] Leech therapy reduces pain, stiffness, and joint dysfunction in people with osteoarthritis of the knee as reported by a replacement study within the Annals of Internal Medicine.^[36]

Precaution during Leech Application

During leech therapy, it is very important to take all possible precautions, that includes.^[37]

1. Bleeding and therefore the patient's time period should be normal.
2. Gentle leech handling.
3. With wet cotton, cover the leech.

DISCUSSION

Adverse effect of leech therapy

Leech therapy may be a very safe treatment, but local discomfort, itching, hypotension, vasovagal assault, hemorrhage, infection, allergies, ulcerative necrosis and transmission of infectious diseases are a number of the adverse effects recorded by scientists.^[38] Because of hirudin, bleeding from wound following leech bites may persist from several hours to 3 days till action of hirudin is over. Allergy to leech bites, even severe allergic or anaphylactic reactions has been reported. Red blotches or an itchy rash within the body, swelling round the lips or eyes, feeling of fainting or dizziness and difficulty in breathing are a number of the clinical features present in allergies.^[39] The wound can get infected due to the presence of bacteria present in the gut of leeches. On forceful withdrawal of leech from the location of leech bite, leeches may vomit and contents within the stomach will inherit contact with wounds and this might complicate the wound occurred due to leech bite.^[40]

Frequency of Leech application

According to disease and severity, the frequency of leech application can vary. Leech can usually be used for up to 6 sessions once every week. For preventing cross infection among various patients, one Leech should be reserved for a selected patient.^[41]

CONCLUSION

All medical system aims to revive those that are ill to health. Leech therapy is considered as a best example of medical treatment valued in both complementary and traditional medicine. Leeching was a popular therapeutic

practice throughout the ages for a wide range for diseases and it had been applied as an unscientific home remedy by traditional therapists. Nowadays, leech came back to the contemporary medicine with fewer applications, which were proven and supported by an enormous number of scientific studies and case reports. This article compiled all maximum available literature associated with leech therapy in Ayurveda, starting from classical texts to modern clinical trials. Traditional medicine, including traditional Indian medicine (Ayurveda), has particular strengths and far to supply conventional medicine. The success of leech therapy depends not only on the biological properties of leech's secretion but also from the experience of a doctor and joint actions of a patients and a doctor. It is expected that a lot of traditional medical treatments will find their way into the integrated medical systems of the longer term. Where traditional medicine is practiced to high standards, with in-depth understanding of its strengths, the aforementioned studies suggest that it can contribute significantly to integrated medical aid, to the advantage of humanity.

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