



International Journal of Ayurveda and Traditional Medicine

Practice of Leech Therapy in Ayurveda-Siddha-Sowa Rigpa-Unani (ASU) System of Medicines: A Cost Effective Treatment.

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ABSTRACT

Leeches are used as bio-therapy, which is widely practised in Ayurveda-Siddha-Sowarigpa-Unani (ASU) systems of medicine in India and abroad. In Ayurveda, medicinal leech therapy is known as *Jaloukavacharana*, in Siddha as *Attaival* and in Unani medicine called as *Irsal-e-Alaq*. Scientifically, Leech application is known as '*Hirudotherapy*' or '*Hirudin therapy*'. In the ASU medical system, non-poisonous leeches are used for curative purposes and are considered as the most easy and cost-effective method of bloodletting. In the past 50 years, leeches have been used in reconstructive microsurgery. Currently, medicinal leech therapy is considered as an integral part of the armamentarium to salvage vascular compromised flaps or replants. During the 21st century, several clinical studies were performed in America, Germany and India to demonstrate the holistic healing effect of leeches in the treatment of pain. Leech therapy is now officially recognized as a classic alternative therapy in some countries of Eastern Europe, Russia and Asia. It is practised in the diseases of phlebitis, osteoarthritis, hypertension and glaucoma. While in India, application of medicinal leech is considered to be the most ancient and affordable therapeutic procedure for the management of pain and skin ailments. This article aims on easy practice of leech therapy by the ASU practitioners as a cost-effective treatment method.

Keywords: ASU Medicines; Bloodletting; Hirudotherapy; Leech therapy.

INTRODUCTION

Medicinal Leech therapy has been an active part of traditional Indian medicine throughout its history. The word "leech" is a derivation of the Anglo-Saxon word of physician 'laece', meaning "to heal". Leech therapy is one of the classical methods of bloodletting in ASU medical system widely practised in India and abroad. It is a part of multidisciplinary treatment which forms complementary and integrative methods of treatment. Leeches were first named by Linnaeus in 1758 AD.¹ Records indicate that use of medicinal leech dates back to ancient Egypt and Greece which became popular during the middle ages, when it was the main method of medicinal bloodletting or

"purification" as the leech secretes various bioactive substances. In 2004, leech (*hirudomedicinalis*) was approved as medical device by the Food and Drug Administration (FDA) and also issued indications for use of the medicinal leeches.²

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As the leeches are considered to be natural, non-invasive, and drugless, no-side-effects bio-therapy. This procedure of bloodletting is often prescribed to treat a variety of conditions that ranges from fever - headache to wound management. In the 1970s, *Hirudotherapy* re-emerged as an adjunct to plastic, reconstructive and trauma surgery. The development of microsurgery made it possible for surgeons to reattach severed blood vessels after traumatic amputation and transplant skin flaps. However, venous congestion and poor drainage of blood from tissue often caused these procedures to fail. Medicinal leech has been used by reconstructive surgeons in recent years to aid salvage of compromised microvascular free-tissue transfers, replanted digits, ears, lips and nasal tips.³ Leeches are known by following vernacular names - Leech (English); *Hirudo* (Latin); *Alaq* (Arabic); *Zalu* (Persian); *Jonk* (Urdu); *Salook* (Turkish); *Bdella* (Greek); *Jalouka* (Sanskrit); *Joka* (Odia); *Jalu* (Hindi); *Jalagalu* (Telugu); *Attai* (Tamil); *Jiganey* (Kannada); *Jonk* (Bangla). In Ayurvedic Medicine, leech therapy is called '*Jaloukavacharana*' and is mentioned as one of the most important *Anushastrakarma* which is included in *Shashti Upakrama* for the management of wound⁴. In Siddha medicine, leech application is known as '*AttaiVidal*' while '*Irsal-e-Alaq*' or '*ZalooDarmani*' in Unani system of Medicine. In mythology of India, the God of Ayurveda - *Dhanwantari*, is shown holding *Jalouka* (leech) in one of his hands.⁵ Leeches can be considered as one of the best methods to suck out impure blood from one's body.

The study is carried to describe the indication and use of Leech therapy in ASU system of medicine, their prospective as a cost-effective treatment procedure.

METHODS

The materials were searched with the term - Leech Therapy on ASU texts, Indian Materia Medica and other classics. Various published research articles were also searched for this study.

RESULTS

***Jaloukavacharana* (Leech therapy) in Ayurvedic literature:**

Acharya Sushruta is considered as the father of Vedic Surgery. A clear description is found on *Jaloukavacharana* (Leech therapy) in *Sushruta Samhita*. Among four different types of *Ashastrakrita Raktamokshana* (bloodletting without sharp

instruments)- *Shringa* (Horn), *Alabu* (Gourd), *Jalouka* (Leech) and *Ghatyantra* (Cupping therapy), *Jaloukavacharana* is said as the prime therapy in bloodletting because of its safe and high efficacy in the disorders involving the vitiation of blood. New researches in Ayurveda have shown that leech therapy is an effective treatment for rapid reduction of pain associated with osteoarthritis.⁶ It is safe and also indicated in children. *Kukunka* (Eye disorder).⁷ In Ayurveda, *Jalouka* (leech) has been classified in two major varieties based on their therapeutic role, the *Savisha* (poisonous / unfit for therapeutic purposes) and *Nirvisha* (Non-poisonous / fit for therapeutic purposes). These are further sub-classified into six types each.

***AttaiVidal* in Siddha System**

In Siddha, leeches are classified into three types i.e., good leech, bad leech and ordinary leech. Good leeches are further classified into four groups.⁸ Leeching procedure is elaborately defined in Siddha classical text '*AgasthiyarNayanavidhi*' which deals with the collection of leeches, storage of leeches, preparation of patients, purification of leeches, main procedure and post-operative procedure. '*Attaividal*' (leech therapy) is one of the ways of bloodletting which comes under the external therapies of Siddha. Leeches have been used for therapeutic purposes for over 2000 years by the ancient '*Siddhars*' which state that speckled leeches have many active compounds in their saliva which remove toxins and impure blood and cures many diseases efficiently. According to Siddha texts, *Attaividalis* employed in twenty seventh place of external therapy under the bloodletting methods. *Attaividal* is indicated for traumatic swelling, tumours, sprain, skin diseases, headache, bleeding haemorrhoids, splenomegaly, headache induced by amenorrhoea, arthritis and eye diseases.⁸ It is also used to treat various medical and surgical condition like - gouty arthritis, abscess, ulcers and other *Pittam* diseases like *Veekkam* (traumatic swelling), *Valiazhalkeelvaayu* (rheumatoid arthritis) etc.⁹

***Irsal-e-Alaq* in Unani Medicine**

Leeches play a major role in the Unani system of medicine as one of the most important regimental therapies and is known as *Irsal-e-Alaq* (Leech therapy). *Irsale Alaqis* a method of blood-letting which involves the withdrawal of blood in a considerable quantity from the body with the help of Leeches.¹⁰ Eminent Unani physicians like Rufus, Zahrawi, Ibn Sina, Razi, Al-Baghdadi, Al-Masihi, Jurjani etc. have described and practiced the use of non-poisonous (medicinal) leeches in

a number of diseases like joint diseases, chronic non healing ulcers, diseases of eyes, nose and various skin disorders like eczema etc.^{11,12} This therapy is quite popular in countries like Arab, Iran and Egypt.

Description of Leech

The use of the medicinal leech is quite safe, efficacious, economical, and well-tolerated intervention if used in a standard way. Leeches have been used throughout the world as remedies for the throat and inflammatory swellings on account of their property of sucking blood. Leeches are segmented worms from the *Annelida* family and are grossly classified into two types – poisonous and the non-poisonous. About 51 species and eight subspecies so far known within India.¹³ Leeches live in freshwater and are hermaphrodite, carnivorous worms. They are sensitive to vibrations on the water, touch, light, heat, sound and various chemicals. They are multisegmented, including “brain parts” and each segment has different organs such as ganglions and testicles. Two sucker parts work for creeping and adherence; the anterior one has three jaws including many teeth. They generally bite warm parts of the host and suck its blood with rhythmic contractions.^{14,15} Feeding usually takes almost 40 minutes and a leech ingests 10–15 ml of blood per feeding. Digestion is achieved by many enzymes and symbionts such as *Aeromonas hydrophila* and *Pseudomonas hirudiniae* play the main role.^{16,17} This bacterium aids in the digestion of ingested blood and produces an antibiotic that kills the other bacteria that may cause putrefaction. The medical term for such a cornucopia of effects is called a multifactorial mechanism. The entire course of treatment may require one to six treatments or more, depending upon the goals and rate of response. A fully matured adult can be up to 20cm in length.

The common species found in India is *Hirudinaria granulosa*. Besides these, *Macrobdella decora* (American medicinal leech), *Hirudomichaelsenii*, *Hirudonipponia*, *Hirudoverbana*, and *Hirudoorientalis* are also being used for therapeutic purposes. For various therapeutic purposes, the European medicinal leech species - *hirudomedicinalis* also known as the healing leech, is preferred by the majority of physicians compared to the American species, *Hirudo decora*, which can suck less blood due to a smaller and superficial incision on its prey skin. The other common Indian species are *Hirudinariaviridis*, *H. javanica*, and *H. manillensis*.

Collection and Storage of Leeches

Leeches are best collected during the autumn or rainy season.¹⁸ Mornings are the preferred time to apply leeches as the leeches will be fresh and not hyperactive. Before

use, leeches are smeared with a paste of mustard and turmeric, which acts as a disinfectant and increases their ability for blood-sucking. Leeches are kept in a jar of freshwater for half an hour prior to use and should be fed on algae and powdered dried meat of aquatic animals¹⁹. Placing straw and aquatic plants in these jars helps create an appropriate environment. The water should preferably be distilled, non-chlorinated or bottled water and be changed daily, and the food residue cleaned every 3 days. Transferring the leeches to another jar, once a week, also appears beneficial. Distilled water with added hirudosalt is also being used by the leech breeding farms in many countries. Hirudosalt is a specially formulated recipe for making up water ideally suited for the maintenance of the medicinal leeches. It may also be kept in dechlorinated tap water, however, the ideal water for long term storage would be distilled water with added hirudosalt.²⁰ It is suggested not to use distilled water alone as it is thought to deplete the animal’s ‘ions’. Simply 0.5g of hirudosalt is stirred into each litre of water to make the ideal environment for leeches. If dead leeches are found during changing of the water, they are removed and disposed of to keep the remaining leeches safe and healthy.

Disposal²⁰:

In contemporary practise, leeches once used should not be reused for medical purposes. So, fed leeches are kept in a separate container and properly discarded as bio-hazardous waste. Each leech should be disposed of by immersion in 70% alcohol solution for 5-10 minutes followed by using an incinerator. But in Ayurvedic practise, the leeches should be made to vomit which is carried out by gently sprinkling turmeric powder at their mouths. When they ingested blood begins to come out from their anterior sucker, gently squeezing their body from caudal to front end is required for proper and complete removal. The used leeches are kept in separate jars/pots labelled with the details of the patient. Though the number of leeches and their application frequency varies from patient to patient and size of the leech, mostly leeches are applied once in a week and used leeches should be reserved for that particular patient to avoid cross infection.

Indications for Leech Therapy in ASU Medicine:

The ancient Physicians of India, used to treat chronic skin diseases, eye diseases, musculoskeletal diseases, gynaecological disorders, ENT disorders as well as mental illness. In Dentistry it has also been used in root canal treatment.²¹ As an adjunct to the healing of graft tissue when problems of venous congestion may delay healing, or to overcome problems of venous congestion

by creating prolonged localized bleeding. The bloodletting by leeches had been used as an adjunct in the management of severe postoperative macroglossia, besides the conventional treatment. Cases have been reported about the uses of leech in treating sublingual haematoma and massive lingual haematoma, in gum diseases, as a remedy for abscess and inflammation²² The therapy is indicated on Benign tumors, Abscesses and boils, Skin disorders - such as dermatitis, psoriasis, vitiligo, alopecia, ulcers, Gout, Diseases of the throat, Diseases of the eye, Cysts, Headaches, Herpes zoster, Thrombosis, and wound management—such as diabetic, pyogenic wounds.

Leeches drain the inflammation at the site of abscess. Anticoagulants increase blood flow in the gums, eliminating toxins, increasing nutrition at the affected area. The antibacterial components in leech saliva reduce bacterial growth. Nowadays use of leeches in thromboembolic diseases (coronary artery thrombosis and Ischemic heart diseases), plastic surgery, replantation and other reconstructive surgeries is very famous all over world.²³ Major indications of Leech Therapy mentioned in Unani classics are *Jarabul Ajfaan* (Blepharitis), *Dawali* (Varicose Vein), *Dardepindali* (Calf Muscle Spasm), *Malankhoolia* (Mania), *Qooruhekhabisa* (septic wound, non healing ulcer), *Waram* (inflammation) of organs, *Khanaazeer* (Lymphadenitis), *Warame TajaweefulAnaf* (sinusitis), *Warmehalaq* (Pharyngitis), *Bawaseer* (Piles), *Nawaseer* (Fistula in ano), *Daaul feel* (Elephantiasis), at the biting site of poisonous animals, skin disorders like *Qooba* (Ringworm), *Saafa* (Alopecia), *Namash* (Nevus), *Kalaf* (Chloasma), *Nar-e-farsi* (Eczema), *Daulsadaf* (psoriasis), *Bars* (Vitiligo), *WajaulMufasil* (Osteoarthritis), hypertension etc.^{24,25,26}

Leech Therapy is contraindicated in the conditions of Hemophilia, Anemia, Leukemia, Hypotonia, Pregnancy,²⁷ Previous allergic reaction to leeches, Unstable medical status, Immunosuppression (eg, HIV infection, concurrent chemotherapy).

Application of Leech

A) Pre-operative procedure: Prior to therapy a written informed consent should be obtained from the patient. Purification of leech is done, by putting them into a vessel of turmeric water and allowed to remain there for 10-15 minutes and then transferred into normal water.²⁸ Legendary Unani scholar, *IbneSina* in his famous treatise "Canon of Medicine", narrated that leeches should be collected just one day prior to their use. Patient is advised to take a light semi-solid diet prior to the

procedure. The affected part to be treated is thoroughly washed with distilled water or with a solution of borax and rubbed until redness appears. If the leech is reluctant to attach, a tiny droplet of blood may be smeared on the part to be treated and then leech is applied. Usually, one or more leeches are applied to the affected area and left for half an hour. Once the leech is attached, it will likely remain safely in place until fully distended, but it is essential to check the site continuously to ensure that the leech hasn't separated. Thereafter, the leeches are detached in a very careful manner by pulling them off or by loosening their grip with table salt, borax or heat but sometimes leeches detach automatically.^{29,30,31,32.}

B) Main procedure: Lesion is to be cleaned by sterile water and swiped with sterile cotton. The activated leeches to be applied over the site of lesions. Leech becomes elevated like a horseshoe or raised in an arched position and blood sucking motility movements in its body indicate that the leech is sucking the blood vigorously or strength fully. While sucking leeches should be covered with a wet cotton pad and regularly sprinkled with cold water. The leeches usually detach from the site after sucking the vitiated blood (approximately 48 to 60 minutes) or have to be removed by sprinkling turmeric powder over it when the patient complains of pain or itching.

C) Post-operative procedure: After the removal of the leech, blood should be allowed to flow from the wound for a few minutes. The site is cleaned and applied with turmeric powder or *Shatadhauta Ghrita* (an Ayurvedic herbal ghee preparation) can be applied to promote healing. The wound is then lightly bandaged.³³ In Siddha system, the sites are cleaned and dressed in pulp of *Aloe vera* dusted with turmeric powder.

Mode of Action

Leech saliva contains several bio-active substances including anticoagulants, anesthetics, vasodilators and prostaglandins. Hirudin is a potent anticoagulant that inhibits conversion of fibrinogen to fibrin, thus preventing blood clotting. In Siddha medicine, leech therapy was used as one of the bloodletting techniques to remove the toxic blood from the body. According to Siddha concept, the leech application works on the basis of normalisation of *Uyirthatkaly* by removing toxic blood from the body and curing diseases. It was used for various diseases especially for *Pittamvitiated* diseases, because the leech has *Tapta Gunam* (cold potency).

According to Unani Medicine, leech therapy works on the principles of *Tanqiyae Mawad* (Evacuation of morbid humours) and *ImalaeMawad* (Diversion of humours). *TanqiyaeMawad* means the resolution and excretion of morbid humors and excess fluids from the body, thereby maintaining the homeostasis in the quality and quantity of four body humors, which is actually responsible for the maintenance of normal health. *ImalaeMawad* refers to the diversion of the morbid fluids from the site of the affected organ to the site where it is easily expelled from the body tissues. Based on this holistic approach, Unani practitioners have been widely using this therapeutic regimen for a number of diseases. The effectiveness of this therapy may also be attributed to the *Mussakin* (sedative) and *Muhallil* (anti-inflammatory) actions of saliva of leeches.^{8,32}

Table 1. Showing leech saliva containing different substances ³⁰		
Sl no.	Substance found	Action
1	Hirudin:	It has an anticoagulant effect. Inhibits blood coagulation by binding to thrombin.
2	Vasodilator:	It has acetylcholine and histamine-like substances as well as carboxypeptidase A inhibitors. These can increase blood flow by dilating constricted vessels.
3	Anaesthetic compound:	Allows for painless attachment
4	Calin:	Binds to collagen and produces a prolonged anticoagulant effect up to 10 hours.
5	Destabilase:	Dissolves fibrin and has thrombolytic effects.
6	Hirustasin:	Inhibits kallikrein, trypsin, chymotrypsin, and neutrophilic cathepsin G.
7	Bdellins:	Anti-inflammatory effect and inhibits trypsin, plasmin and acrocin.
8	Chloromycetin:	Potent antibiotic.
9	Tryptase inhibitor:	Inhibits proteolytic enzymes of host mast cells.
10	Eglins:	Anti-inflammatory. They inhibit the activity of

		alpha-chymotrypsin, chymase, subtilisin, elastase, and cathepsin G.
11	Carboxypeptidase:	A inhibitors: Increase the inflow of blood
12	Factor Xa Inhibitor:	This restrains the coagulating effect of the coagulation Factor Xa
13	Hyaluronidase:	Hyaluronidase enhances the viscosity of interstitial fluid.
14	Antibacterial Enzymes:	Boost the immune system and fight of further Infection.
15	Anti-inflammatory agents:	Aid in reduction of inflammation thereby blood can pass freely into the vessels

The anticoagulant property of Hirudin contained in leech saliva will lead to wider therapeutic application in the prevention and treatment of thromboembolic disease like angina pectoris, coronary thrombosis, atherosclerosis and varicose vein. Leeches may also secrete a vasodilator, histamine-like substance, which increases the inflow of blood after a leech bite and reduces local swelling. Hyaluronidase, known as the “spreading factor”, can degrade tissue hyaluronic acid, thus facilitating the infiltration and diffusion of the remaining ingredients of leech saliva into the congested tissue.

Table 2. Showing Pioneer centres of ASU in India for Medicinal Leech therapy. ^{34,35,36}			
Sl no.	Ayurveda	Siddha	Unani
1	National Institute of Ayurveda, Jaipur	National Institute of Siddha, Chennai	National Institute of Unani Medicine, Bengaluru
2	All India Institute of Ayurveda, New Delhi	Govt. Siddha Medical College, Arumbakkam, Chennai	A & U Tibbia College, New Delhi
3	Sir Sunderlal Hospital, IMS, BHU, Varanasi	Govt. Siddha Medical College, Palayamkottai, Tirunelveli	Govt. Nizamia Tibbia College Hospital, Hyderabad
4	Govt. Ayurveda College & Hospital,	Santhigiri Siddha Medical College, Thiruvananthapuram	Majeedia Unani Hospital, Jamia

	Thiruvananthapuram		Hamdard, New Delhi
5	Rajiv Gandhi Govt. PG Ayurvedic College, Paprola, HP		State Unani Medical College Hospital, Allahabad
6	Ayurvedic Hospital & Research Centre, Kottakkal		Ajmal Khan Tibbiya College, AMU, Aligarh
7	ITRA, Jamnagar		

National Research Institute for Sowa-Rigpa, Leh is a premier centre for Amchi Medicine. In Sowa Rigpa or Tibetan Medicine leeches are also used. For instance, leeches are used for bloodletting in some parts of Bhutan. They are plentiful in the lower valleys in the monsoon season and less traumatic for a patient whose blood pressure rises as he contemplates being cut.³⁷

DISCUSSION

Medicinal leeches are easily available everywhere in India. The ASU system of medicine is practised far and wide as traditional healing methods. Compared to other methods of bloodletting, hirudotherapy is not that expensive treatment. A decade back at Varanasi, a leech costs anything between Rs 25 to Rs 40,³⁸ but now in BHU's Sir Sunderlal Hospital, a single sitting of Leech therapy costs Rs 100 only.³⁹

The most important part is proper collection and use of medicinal leech in specified conditions only. Leech saliva contains anaesthetic that makes the bite of the leech painless to its host; a histamine like vasodilator which increases the blood flow to the feeding areas by increasing the blood vessels diameter; and a chemical enzyme called hyaluronidase, which facilitates the degradation of the connective tissues around the bite site allowing the vasodilator substance, wider access to the area. There is also the anticoagulant Hirudin, which is responsible for inhibiting blood coagulation and is employed as an anticoagulant in surgical operations and has been recommended for the prevention of phlebitis and postoperative pulmonary inflammation. Leeches can be applied once a week depending on the severity of the

disease.^{40,41} Blood-letting in the form of venesection, leech therapy and cupping with scarification is an essential part of regimental therapy in Unani. The advantage of leech therapy is that it may be advised on those areas of the body where other processes of blood-letting like venesection and cupping are not possible. According to *Kitab al-umda fil al-jarahat* (Vol 1) leeching removes more morbid humor than cupping but less than venesection. Ayurveda opines it can be applied to the *Sukumara* (delicate) persons.⁴²

The US FDA has approved medicinal leeches for commercial marketing, not as drugs, but as medical devices. According to FDA, leeches meet the definition of a device because they are considered to be articles intended to diagnose, cure, treat, prevent, or mitigate a diseased condition, or to affect a function or structure of the body that do not achieve their primary effect through a chemical action and are not metabolized. If used judiciously, leeches can get blood flowing in regions that even a skilled surgeon cannot.⁴³ Leech therapy can be learned relatively quickly and mastered by ASU practitioners. It can be a good example of a cost-effective medical treatment for both complementary and conventional medicine.

Prior to the application of leech, usually detoxification is done with turmeric water so rarely any side effects are seen. But, occasionally in some cases the patient's complaints of local itching. Theoretically, leech therapy carries an infection risk because of the colonization of *Hirudomedicinalis* with *Aeromonas hydrophila* bacteria.⁴⁴

CONCLUSIONS

The reviewed ASU medical literature demonstrates the importance of leech therapy as an immediate, safe and cost effective treatment option. Leech therapy has a good history in Indian systems of medicine, it can reduce the complications arising from the excessive use of synthetic drugs. This technique is easy to apply and its modes of action have been elucidated for many diseases. However, keeping in view of their extensive use in ASU medicines, establishment of leech farms is the need of the day to further ensure their safety and minimize any possible risk.

ACKNOWLEDGEMENT

I want to acknowledge Dr. Arun Kumar Das, Principal, Government Ayurvedic College, Balangir, Odisha, India. and Dr. Kamini Kar, Principal, SSN Ayurveda College &

Research Institute, Paikmal, Odisha, India for their support to the study.

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Source of Support: Nil
Conflict Of Interest: None Declared

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