

LEECH THERAPY: HISTORICAL ROOTS AND CURRENT CLINICAL STUDIES

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ABSTRACT

Leech therapy is a method of bloodletting that has been used around the world for centuries in traditional Indian medicine. More popularly known as Hirudotherapy, this alternative and integrative medical practice uses the medical leech (*Hirudo medicinalis*) as an agent, and involves placing the leeches on the skin so that their saliva can be utilized for medicinal purposes. A practice that dates back to ancient medicine, and has been known by many different names, such as Irsal-e-alaaq/Taleeq in Unani & Jaloukavacharana in Ayurveda. This procedure has been used to treat various medical ailments, utilizing the leech's ability to suck out blood and create a healing environment. This paper delves into the historical foundations of leech therapy, exploring its evolution and current clinical applications. Through a comprehensive review of existing studies, we examine the efficacy and safety of leech therapy, shedding light on its potential benefits and limitations in modern healthcare. By bridging the gap between traditional practices and contemporary medicine, this study aims to provide insights into the therapeutic potential of leech therapy and its future prospects.

KEYWORDS: Leech therapy, ASU system, Hirudotherapy, Bloodletting, Clinical studies.

INTRODUCTION

Throughout history, leech therapy has played a significant role in traditional Indian medicine. The word "leech" comes from the Anglo-Saxon word "laece," which means "to heal," in the context of medicine. Leech therapy is a traditional practice of bloodletting in the ASU medical system widely practiced all around the world.^[1]

About Therapy

Medicinal leech therapy (MLT) or hirudotherapy is a complimentary and integrative treatment using blood-sucking leeches. One or more leeches are applied to the skin of the troublesome site with the intention of gaining potential benefits from leech saliva released when the leeches are feeding.^[2]

Analogous Names

- **K/a 'Hirudotherapy'**- a Latin term, in which medicinal leeches (*Hirudo medicinalis*) are used, hence named so.
- **Irsal-e-alaaq or Taleeq** - 'Alaaq' is an Arabic word, which is synonymous for leech and the process of leech application is termed as Taleeq.
- **Bdellotherapy** - bdella being the Greek word for the leech.
- Formerly, it was known as '**Leech Craft**' also.

- In Ayurvedic Medicine, leech therapy is called '**Jaloukavacharana**'.
- In Siddha medicine, leech application is known as '**AttaiVidal**'.

Historical Review

Leech therapy, also known as Hirudotherapy, is one of the oldest known forms of medical treatment, with evidence suggesting its practice as early as 1500 B.C. in Ancient Egypt. Leech illustrations were discovered in the tombs of Egyptian pharaohs from the 18th dynasty (1567–1308 B.C.). These illustrations show leeches being used on the heads of patients, marking some of the earliest documented applications of leeching for therapeutic purposes. Leech therapy was also recorded in Sanskrit writings from around 1300 B.C., underscoring its widespread use in ancient India.

Ancient civilizations such as Greece, China, India, and Pre-Columbian America utilized leech therapy extensively. In Greece, Nicander of Colophon (200–130 B.C.) is considered one of the earliest medical practitioners to use leeches in therapy. Leeches were used for bloodletting to treat conditions like rheumatic pains, gout, various fevers, and even hearing loss.

The rationale behind leech therapy in ancient Greece was based on the humor theory proposed by Hippocrates (460–370 B.C.) and later expanded by Galen (130–201 A.D.). Hippocrates hypothesized that diseases were caused by imbalances in the body's fluids, or "humors." Galen adopted this theory and believed that restoring balance between the four humors (blood, phlegm, yellow bile, and black bile) could alleviate illnesses.

In the Islamic Golden Age, Avicenna (980–1037 A.D.), a prominent Persian physician, contributed significantly to medical literature, particularly through his famous work "The Canon of Medicine." Avicenna endorsed leech therapy, stating that leeches could extract blood from deep veins, which were difficult to reach through other methods like wet cupping. This expanded the therapeutic use of leeches beyond superficial treatments to deeper vascular conditions.

Leech therapy experienced a resurgence during the 18th and early 19th centuries, when it became highly popular, especially in Europe. By the early 19th century, leech demand had surged, and countries like France were importing millions of leeches annually to meet the needs of the medical profession.

A pivotal moment in the history of leech therapy came in 1884 when J. B. Haycraft discovered that the mouth of the leech contained a substance that prevented blood from coagulating. This anticoagulant, later named *hirudin* by Jacoby around 1904, revolutionized the use of leeches in medicine. Hirudin's anticoagulant properties allowed blood to flow freely from the wound created by the leech, making leeches particularly useful in treating circulatory disorders. By 1915, hirudin was employed in blood transfusions, marking a significant advancement in medical science.

The practice of leech therapy saw another resurgence in the 1970s, when it became popular as an adjuvant in plastic and reconstructive surgery. Surgeons found that leeches were particularly effective in reducing venous congestion during microvascular replantation surgeries, where blood clots or poor circulation could threaten the survival of reattached tissues. By preventing blood from clotting and promoting healthy blood flow, leeches became an invaluable tool for ensuring surgical success.

In July 2004, the U.S. Food and Drug Administration (FDA) officially approved the use of medical leeches as medical devices in the fields of plastic and reconstructive surgery. This approval cemented the modern role of leech therapy in medicine, allowing surgeons to treat a range of conditions with greater precision.

Today, leech therapy is used in neurology, dermatology, gynecology, and surgery, continuing its ancient legacy in modern medicine.^[3]

LEECH THERAPY IN OTHER CSM

In the Unani system of medicine, leech therapy, known as *Irsal-e-Alaq*, is an important regimenal therapy used for bloodletting. This method involves the use of medicinal, non-poisonous leeches to withdraw blood for treating various ailments. Renowned Unani physicians like Rofus, Ibn Sina, Razi, and Al-Baghdadi employed leech therapy to treat joint diseases, chronic non-healing ulcers, eye and nose diseases, and skin disorders such as eczema.

In Ayurveda, Leech therapy is called "Jaloukavacharana". Acharya Sushruta, known as the father of Vedic surgery, detailed leech therapy (*Jaloukavacharana*) in the *Sushruta Samhita*. He classified it as the most effective form of non-invasive bloodletting (*Ashastrakrita Raktamokshana*) including Shringa (Horn), Alabu (Gourd), Jalouka (Leech) & Ghatyantra (Cupping therapy) due to its safety and efficacy in blood disorders. Leech therapy is also recognized for reducing pain in osteoarthritis and is safe for children. In Ayurveda, leeches are categorized into two types: *Savisha* (poisonous, unfit for therapy) and *Nirvisha* (non-poisonous, fit for therapy), with further subdivisions of six in each category.

Leech therapy is known as *AttaiVidal* in Siddha medicine & the procedure is elaborately defined in Siddha classical text as 'AgasthiyarNayanavidhi' which deals with the collection of leeches, storage of leeches, preparation of patients, purification of leeches, main procedure and post-operative procedure. Three types of leeches are there i.e. good leech, bad leech and ordinary leech. According to Siddha texts, Attaividal (leech therapy) is the 27th external treatment method for bloodletting. It is used to treat conditions like tumors, sprains, skin diseases, bleeding hemorrhoids, arthritis, headaches, splenomegaly, and eye diseases. It is also effective for conditions such as gouty arthritis, abscesses, ulcers, and other Pittam disorders e.g. Veekkam (traumatic swelling), Valiazhalkeelvaayu (rheumatoid arthritis) etc.^[1]

CLINICAL STUDIES ON LEECH THERAPY

Leech therapy, has garnered attention across various systems of medicine, for its therapeutic potential. Clinical studies have shown its efficacy in treating a range of conditions, such as pain management, wound healing, and blood circulation disorders. In Unani medicine, leeches are used for their detoxifying properties, promoting balance within the body and addressing issues related to blood disorders and inflammation. Similarly, traditional Ayurvedic practices utilize leech therapy for detoxification and to balance bodily humors. In Western medicine, leeches are frequently employed in reconstructive surgery to enhance venous drainage and minimize blood clots. Research highlights promising outcomes in areas such as osteoarthritis, where leech therapy has been associated with reduced inflammation and improved joint function.

Furthermore, leech saliva contains bioactive compounds with anticoagulant and analgesic properties, expanding its therapeutic applications. Some of the notable clinical studies on leech therapy across these medical systems are presented here, underscoring its versatility and potential benefits in patient care.

1. STUDIES ON JOINT DISORDERS

i. Safety and efficacy of leeching therapy for symptomatic knee osteoarthritis using Indian medicinal leech by SM Abbas Zaidi et al. at Jamia Hamdard, New Delhi.^[4]

METHODOLOGY

This study was a prospective, randomized controlled trial involving 40 participants divided into two groups of 20 through block randomization. The test group received both leech therapy (applied to tender points near the knee) and a traditional Unani herbal treatment i.e. Safoof Mafasil Khas, 5 gm. twice daily, which is comprised of Suranjan, Boozidan, and Asgand in equal proportions, along with Suranjan oil 10 ml BD for local application, while the control group received only the herbal treatment. The primary outcome measured was knee pain reduction using the WOMAC pain score, and secondary outcomes included knee flexion (measured with a goniometer) and performance in an 8-meter walk test.

The study lasted 6 weeks with follow-ups at the 14th, 28th, and 42nd days. Results showed a significant reduction in pain (29.02%), stiffness (58.87%), and an increase in functional ability (40.56%), all with p-values < 0.001. However, there was no notable difference in the secondary outcomes between the two groups.

ii. Effectiveness of leech therapy in women with symptomatic arthrosis of the first carpometacarpal joint: A randomized controlled trial by Andreas Michalsen et al. in Germany.^[5]

METHODOLOGY

This study was designed as a randomized controlled open trial with patients randomly allocated by a block-randomization with varying block lengths.



Figure 1. Photograph of right ankle before treatment.



Figure 5. Photograph of right ankle after treatment.

iv. Effectiveness of Leech Therapy in Chronic Lateral Epicondylitis (Tennis Elbow) - A Randomized Controlled Trial by Marcus Ba'cker et al.^[7]

Forty patients with manifestation of epicondylitis of at least 1-month duration were randomized to a single

Test group had Leech Therapy 2–3 medicinal leeches were applied once to the periarticular soft tissue of the affected thumb joint with preference to maximum pain points during examination and palpation & Control Group received 300 g of diclofenac gel applied twice daily throughout days 0–30.

Primary Outcomes were change in total pain score from day 0 to 7 as derived from the mean of the three single 100 mm VAS pain scores (pain at rest, in motion, during grip) & secondary outcomes were Quality of life, functional impairment & grip strength of the thumb joint (lateral pinch power). Duration of study was 60 days with follow ups on 7th, 30th & 60th day.

RESULTS

A significant and comparable group difference favoring the leech therapy was evident among all three subscales of pain. With highly significant between group difference -26.5 (95%CI 40.3; 12.7; p = 0.0003), persisted at day 30 & increased at day 30 (p < 0.0001). DASH score, Quality of life & Grip strength were improved in Leech Therapy.

iii. TREATMENT OF BONE MARROW EDEMA OF TALUS BONE BY JALAUKA AVCHARANA (LEECH THERAPY) by Nitin Jindal et al. at A & U Tibbia College, New Delhi.^[6]

Course of treatment was 3 weeks with follow ups, every week. After first course of therapy the swelling as well as discomfort in walking was reduced considerably. After completion of therapy there was no pain and tenderness, and no swelling was observed over ankle joint. After a period of approximately one month patient's gait showed no abnormality and there was no swelling or tenderness over his foot.

treatment with 2 to 4 locally applied leeches or a 30-day course with topical diclofenac. The primary outcome measure was the change in the total pain score on 100mm visual analog scale (VAS) (pain at rest, in motion, and during grip). Secondary endpoints are Functional impairment measured by the Disabilities of

the Arm, Shoulder, and Hand (DASH) questionnaire, physical quality of life assessed by SF-36 & Grip strength using a device. Leeches induced a significantly stronger decrease of the pain score (143.7 ± 36.9 to 95.3 ± 45.1) compared with topical diclofenac (131.6 ± 29.6 to 134.7 ± 70.7 ; mean difference 49.0; 95% confidence Interval, -82.9-15.1; $P = 0.0075$) after 7 days. On day 45, this group difference was reduced (27.5 ; confidence interval, $60.8-5.8$; $P = 0.110$) due to delayed pain relief with diclofenac. Functional disability showed a stronger decrease in the leech group, which was most prominent after 45 days ($P = 0.0007$). Quality of life increased none significantly in the leech group.

2. STUDIES ON PAIN MANAGEMENT

i. The Effectiveness of Leech Therapy in Chronic Low Back Pain - A Randomized Controlled Trial by Christoph - Daniel Hohmann et al. at University of Berlin^[8]

A proof-of-concept study, conducted as a two-center, open, nonblinded, randomized controlled clinical trial with **Test Group** – Leech therapy at L1 to S3; **Control Group** – Exercise for 60 min each week for 4 weeks. Primary Outcomes were Change in average back pain intensity, as measured using a 100-mm visual analog scale (VAS), after 28 days & secondary outcomes were functional impairment, quality of life & pain perception, depression and analgesic consumption (questionnaire/diary). Study lasted for 56 ± 5 days with follow up after 28 ± 3 and 56 ± 5 days.

RESULTS - Showed reduction in pain at 28 days was significantly greater in the leech therapy group with $p = 0.0018$, and both functional improvement (and enhancement of physical quality of life were more pronounced in the leech group at 28 days and 56 days.

ii. Hirudotherapy in pain management by M. Cengiz, Y. Mehmet in Turkey^[9]

A proof-of-concept study conducted with patients having pain complaints in various forms. The patients ($n = 20$)

were subjected to leech therapy on the day of their visit on the most painful area. In the study, observations were conducted both before and after leech therapy, and VAS scores were recorded to assess pain levels.

RESULTS - A significant improvement was observed in the level of reduction of pain to a level that will disappear in patients who have undergone leech therapy once or twice.

iii. According to Bakhshi et al^[10]

A single session of leech therapy can provide similar pain-reducing benefits to drug therapy in women with migraine headaches & a case series on 7 patients with chronic migraine by Ansari et al.^[11] proved that application of leech for 2 months have shown reduction in the number of headaches & migraine days and amount of painkillers used without any adverse effects. ($P \leq 0.01$).

3. STUDIES IN DERMATOLOGY AND COSMETOLOGY

i. Leech therapy in treatment of cutaneous leishmaniasis - A Case Report by Ashvin V Dudhrejiya et al.

Two patients participated in this study. A 56 years old man who had a wound on his left hand & a 43-year-old lady who had a facial cut, both were identified as Cutaneous Leishmaniasis. They took Leech therapy sessions. 5 leeches were applied during the intervention over the course of 4-5 sessions, spaced 2-4 weeks apart. Before & after treatment photographs were taken.



The photograph of patient's hand with cutaneous leishmaniasis before and after leech therapy
A: before leech therapy + first session; B: second session; C: third session; D: fourth session; E-H: two, three, four and five months after the first session, respectively



The photograph of patient's face with cutaneous leishmaniasis before and after leech therapy A: before leech therapy + first session; B: second session; C: third session; D: fourth session; E: fifth session (one month after the fourth session); F-I: four months, six months, one year and one and half years after the first leech therapy session, respectively.

ii. Efficacy of leeching (Ta'liq al-'Alaq) in patients with vitiligo (bars): a comprehensive case study by Arsheed Iqbal, Adil Rashid, Afroza Jan, Haider at RRIUM, Srinagar^[12]

METHODOLOGY

This was a single group open case clinical study. Twenty patients were selected from OPD and screened before undergoing the study. The treatment efficacy was measured with the help of improvement in clinical parameters and vitiligo area scoring index (VASI) score. Leech is applied according to the area involved. (Min - 2 to max - 10 leeches). Duration of study was 2 months with follow ups on 0, 12th, 24th, 36th, 48th, 60th day.

RESULT - There is strong statistically significant difference ($p < 0.05$) in terms of VASI score which in turn means that the treatment is very effective.

iii. Effect of Leech therapy in the management of Psoriasis by Arsheed Iqbal et al. at RRIUM, Srinagar^[13]

METHODOLOGY

This study was single group open clinical study. 40 patients were selected from the OPD of research center and screened before undergoing the scientific study. Leech therapy was administered once in a week with 10 leeches on the affected part. After the gap of seven days the procedure was repeated for total five sittings and the patients were followed up for a period of one year to watch for any recurrence or relapse of the disease or related symptoms. The severity of psoriasis and efficacy of the leeching therapy was assessed by the Psoriasis Area and Severity Index (PASI) Scale.

RESULT - The study showed significant reduction in the PASI score ($P < 0.01$).

iv. Pain relief effect of Jalaukavacharana (leech therapy) in ulcerative squamous cell carcinoma - a case study by Gunarathna EDTP, Kulathunga RDH & Singh OP, University of Colombo, Srilanka^[14]

METHODOLOGY

The study was conducted on clinically diagnosed case of well differentiated squamous cell carcinoma with painful persistent ulcer in right side of the oral cavity was enrolled in the study. After physical examination, hemotological and biochemical investigations, patient was recommended jalaukavacharana (Leech application) with two medicinal leeches (*Hirudo medicinalis*) in six sittings at the interval of every week for consequent 42 days. Pain was assessed before and after the treatment using numeric pain rating scale (NPRS).

RESULT - Results revealed that pain has been reduced 10% after 1st sitting of leech application. During the treatment, pain was reduced 30%, 35%, 60%, 80% and 90% in 2nd, 3rd, 4th, 5th and final sittings respectively.

4. MISCELLANEOUS STUDIES

Numerous more research conducted in other medical specialties demonstrate its efficacy in treating the illness and its symptoms.

1. In Diabetic Neuropathy [MANAGEMENT OF DIABETIC NEUROPATHY BY IRSAL-e-ALAQ (HIRUDOTHERAPY): A CASE REPORT by Dr. Fatima Khan, Dr A.N Ansari, Dr Mohd Nayab at NIUM BENGALURU^[15]

A 61 years old man who had diabetic neuropathy in left foot was studied for 58 days. Two Leeches were applied around the lesion once a week for nine weeks. With, Irsal-e-Alaq the sensation was restored completely within 58 days, the symptoms of the patient improved a

lot and the size of the lesion reduced with subsequent sittings.

2. Diabetic foot [Unani treatment and leech therapy saved the diabetic foot of a patient from amputation by SM Arif Zaidi].^[16]

A 60-year-old woman suffering with diabetic foot on the left leg was having severe pain in the gangrenous foot and foul-smell. After 3 months of Leech therapy, the wound was completely healed and free from any deformity and pain after 3-5months.



1st Session with 4 leeches on wound



After 3 months

3. In Gangrene [MANAGEMENT OF GHANGRANA (DRY GANGRENE) BY IRSAL-E-ALAQ (LEECH THERAPY) - A CASE STUDY by Lari et al^[17]

A 45 years old male patient was admitted in the male ward of National institute of Unani Medicine, Bengaluru, having complaints of severe pain and wound in right

greater toe from 1 month. Leeches were applied on the dry gangrenous wound twice a week for 30 days. The wound was completely healed at the end of 1 month. Figures show before & after treatment results.



4. Effect of Taleeq (Leech therapy) in Dawali (Varicose veins) by Zarnigar, Md Anwar Alam at NIUM Bangalore^[18]

METHODOLOGY

A Randomized Controlled Trial with patients randomly assigned into two groups - Test Group – Leech Therapy around affected area & Control Group - Compression Stockings Grade 2 + Limb Elevation. Duration of Study was 2 months with follow ups at Baseline & every 15th day. Outcomes were Pain Reduction, Color & area of Pigmentation, Limb Girth & number of incompetent valves before & after treatment.

Results – The study shows significant improvement in all these mentioned parameters in both the groups but is more prominent in patients undergoing Taleeq.

5. Leech got your tongue? Haematoma of the tongue treated with medicinal leeches: a case report by M Ramzan et al. in Netherlands^[19]

This case study reported a 61-year-old female visited with an obstruction of the airway due to massive

swelling of the tongue. She had visited the dentist earlier that day for dental implants, after which the patient developed swelling of the tongue. Computed tomography scan showed a hematoma on the right lateral side of the tongue. Despite of taking antibiotics and sedatives there was no relief. Following which, Leeches were applied to the tongue in an attempt to aid drainage of oedema and hematoma. After three subsequent daily sessions of Hirudotherapy, the swelling subsided.

6. A case study by Sreenath PS, Gopikrishna BJ at SDM College of Ayurveda, Hassan, Karnataka, reported a male patient of 26 years old came with complaints of reddish discoloration of the right sclera associated with abrasion over lateral aspect of nose and pain over peri orbital region after an alleged RTA. After proper investigation, leech therapy was planned as a first line treatment. 1 leech was applied over the side of lateral aspect of right canthus for 45 minutes. Total 3 sittings done. After third sitting of Jalaukavacharana, patient was completely relieved of all symptoms and is satisfied with the treatment.^[20]



Studies have also shown miraculous effects of leech therapy as an adjuvant with oral medications or solely, in Hemorrhoids (First, Second & third degree thrombosed piles)^[21,22], Cellulitis^[23], Perianal hematomas^[24], Eye disorders like Glaucoma^[25], in hair diseases including Alopecia areata^[26] & in various cosmetic and reconstructive surgeries for improving healing also.^[27,28]

DISCUSSION

Hirudotherapy, or the use of medicinal leeches, is a traditional and economical treatment in India, particularly in the Ayurvedic and Unani systems of medicine. The probable mode of action of leech therapy in various medical systems can be attributed to a variety of powerful bioactive chemicals found in leech saliva. Leech saliva contains several bio-active substances including anticoagulants, anesthetics, vasodilators and prostaglandins. Hirudin, found in leech saliva, has anticoagulant properties that could help prevent and treat thromboembolic diseases such as angina pectoris, coronary thrombosis, atherosclerosis, and varicose veins. Leeches may emit a histamine-like chemical that acts as a vasodilator, increasing blood flow and decreasing

edema. Hyaluronidase, often known as the "spreading factor," degrades tissue hyaluronic acid, allowing leech saliva components to penetrate congested tissue more easily.

In Unani medicine, leech therapy is based on two principles: "Tanqiyae Mawad" (evacuation of morbid humors) and "Imalae Mawad" (humor diversion). 'Tanqiyae Mawad' is the process of removing excess fluids and hazardous substances from the body in order to preserve equilibrium in the four humors, whereas 'Imalae Mawad' entails diverting harmful fluids from damaged organs to locations where they may be removed. This therapy is commonly used to treat a variety of ailments, and its efficacy is linked to the calming and anti-inflammatory effects of leech saliva. In Ayurveda, leech therapy (*Jalaukavacharana*) works by balancing the *doshas*, particularly *Pitta* and *Rakta*, through blood purification and detoxification. It is effective in conditions involving blood and heat-related imbalances, as it removes impure blood (*Raktamokshana*) and toxins, helping to cool down the excess *Pitta*. Leech therapy is one of the bloodletting

methods used in Siddha medicine to eliminate poisonous blood from the body. The Siddha concept states that the leech application normalizes Uyirthathukal by eliminating toxic blood from the body and treating illnesses.

Clinical studies on leech therapy have shown promising results, particularly in the fields of microsurgery, dermatology, and pain management. Research has demonstrated the effectiveness of medicinal leeches in improving blood circulation, reducing inflammation, and accelerating wound healing, especially in cases of tissue grafts, varicose veins, and post-operative complications. The future scenario for leech therapy looks promising, as it could become a more widely accepted and integrated treatment option in both complementary and conventional medicine, especially with the rising interest in natural, less invasive therapies. Advancements in biotechnology may also lead to the development of synthetic leech saliva components, further broadening its medical applications.

CONCLUSION

To conclude, Leech therapy is an ancient treatment that utilizes leeches for various ailments. Recent studies indicate that leech therapy can significantly alleviate pain and improve joint function in osteoarthritis patients, enhance blood circulation, and reduce inflammation. It is also beneficial for chronic pain conditions & in wound healing, particularly after reconstructive surgery, as leeches enhance blood flow to compromised tissues, aiding recovery. The growing interest in leech therapy highlights its potential in modern healthcare, with ongoing research likely to broaden its applications in pain relief and healing.

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CONFLICT OF INTEREST

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