A REVIEW ON LEECH THERAPY

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ABSTRACT
Leech therapy has over the centuries established itself as a natural healing method and is recognized today as a modern method of treatment with broad spectrum of effective application showing a high level of safety. Leeches have been used through history to ‘cure’ a number of physiological conditions. They are used to treat a number of diseases including haematoma (blood clots) and venous congestion (where the blood supply can get into the skin flap but not get back). According to this traditional method, bloodletting (‘Raktamokshan’) is done with the help of ‘Leeches’ i.e. Leeches are applied on the desired site for bloodletting. It is considered most unique & most effective method of bloodletting. Here, the vitiated morbid humours (‘Doshas’) are removed from the body without using any cutting instruments; hence Raktamokshan by means of ‘Leech’ comes under ‘Ashastra’ category i.e. without surgery.

KEYWORDS: Leech therapy, Venous Congestion, bloodletting, Hirudin.

INTRODUCTION
Leeches are sanguivorous or blood-sucking annelid worms with ability to extend or contract their bodies. Since antiquity, they have been known for their blood-feeding habits and use in the art of phlebotomy or bloodletting. Although this practice fell into disrepute by the end of the 19th century, it always occupied an important place in the Unani system of medicine to treat various ailments. Most leeches are permanent or temporary external parasites, attaching themselves to the host and sucking blood. Sucked blood is stored in lateral diverticula of the crop and, as the blood passes down the pharynx, it is mixed with a glandular secretion that prevents its coagulation. At a single meal a leech ingests several times its own weight of blood that may suffice for several months.[1,2] Recent scientific research on salivary components has restored its lost reputation.

Hirudo medicinalis is the most frequently used species of leech that is not native to the Indian subcontinent. In India the species used traditionally for therapeutic purposes is Hirudinaria granulosa. Besides these, Macrobdella decora (American medicinal leech), Hirudo
michaelseni, Hirudo nipponia, Hirudo verbena, and Hirudo orientalis[3,4] are also being used for therapeutic purposes.

➤ Anatomy and physiology

Like other annelids, the leech is a segmented animal. But unlike other annelids, there is no correspondence between the external segmentation of a leech's body surface and the segmentation of its internal organs. The body surface of the animal can be divided into 102 annuli, whereas its internal structures are divided into 32 segments.[5-6] Of the 32 segments within the body, the first four anterior segments are designated head segments, which include an anterior brain and sucker. These are followed by 21 midbody segments, which include 21 neuronal ganglia, two reproductive organs, and 9 pairs of testes. Finally, the last seven segments are fused to form the animal's tail sucker, as well as its posterior brain.

➤ TOXONOMICALCLASSIFICATION[7]

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Animalia</th>
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<tbody>
<tr>
<td>Phylum</td>
<td>Annelida</td>
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<tr>
<td>Class</td>
<td>Clitellata</td>
</tr>
<tr>
<td>Order</td>
<td>Hirudinida</td>
</tr>
<tr>
<td>Family</td>
<td>Hirudinidae</td>
</tr>
<tr>
<td>Genus</td>
<td>Hirudo</td>
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<tr>
<td>Species</td>
<td>H.medicinalis</td>
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➤ Type of Leeches

<table>
<thead>
<tr>
<th>Poisonous</th>
<th>Non poisonous</th>
</tr>
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<tbody>
<tr>
<td>Krishna</td>
<td>Kapila</td>
</tr>
<tr>
<td>Karbura</td>
<td>Pingala</td>
</tr>
<tr>
<td>Alagarda</td>
<td>Shank-mukhi</td>
</tr>
<tr>
<td>Saamudrika</td>
<td>Mushifa</td>
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<tr>
<td>Indra-yudha</td>
<td>Pundarik-mukhi</td>
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<tr>
<td>Go chandana</td>
<td>Sea varika</td>
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</table>

Six different types of Leeches are found in both poisonous & non-poisonous category. Basically, these leeches are named according to their appearance i.e. their external look or colour. The leech was used in medicine as a means of "local depletion" (bloodletting) from the ancient days.
As part of the materia medica of the popular bloodletting treatment to get rid of bad blood, a healthy leech can draw one or two fluid drachms of blood. It was noticed that leech bites continued to bleed after the leech was withdrawn. In cases of extreme debility five to eight leeches can be used. 

HOW DO LEECHES WORK.

Medicinal leeches have three saw-like jaws (tripartite) with about 100 sharp teeth on each jaw. After piercing the skin they inject anti-coagulants (Hirudin) and suck out blood. Large adult leeches can consume up to ten times their body weight in a single meal. Leech therapy involves an initial bite, during which the leech sucks between 5 and 15 mL of blood, for a period of 20 to 45 minutes. During the post attachment period the site continues to bleed. The therapeutic benefit is caused by components in the leech's saliva; hirudin, a protein anticoagulant and histamine-like substances that induce vasodilation. The effects of treatment lie in the amount of blood that a leech ingests and anticoagulant enzymes that allow the blood to flow from the site when the
leech is detached [10]. The leech produces a number of substances; anticoagulants like hirudin, calin, inhibitors of kallikrein, hyaluronidase, histamine-like vasodilators, collagenase and poorly characterized anaesthetic and analgesic compounds.

- **Operative Procedure**

  The patient having disorder to be treated with Leech should be asked to sit or lie down. Then the shodhit Leech should be applied on affected part of body of patient to suck blood. Then cover the Leech with smooth white cloth or cotton swab. Do not cover the mouth of the Leech; otherwise it will not suck blood. If the leech does not suck blood, then put some drops of blood or milk in the affected area. If Leech does not start sucking blood by doing so, slight incision should be made over the affected area. Anterior sucker of Leech assumes the shape of Horse shoe during blood sucking. When sensation of itching and pain occurs at the affected area, it indicates that Leech started to suck the fresh blood, and then Leech should be removed.[11]

- **Indication & Utility of Leech Therapy:**

  It is used effectively in the management of non-healing ulcerative lesions like Diabetic ulcer, leprotic wound etc. as it helps to improve the local blood circulation. Hence, healing is promoted. It relieves vascular congestion. So, it can be effectively used in conditions like long standing Varicose ulcers, Filariasis, post-operative skin grafting lesions. It is used in arthritis, sprain or spasm to relieve the pain, inflammation & discomfort symptomatically. It is used in abscess, cellulites, thrombophlebitis and varicose veins, it is also useful in third degree thrombosed prolapsed piles, in atherosclerosis of the limb as it improves circulation useful locally to treat hyper pigmentation. Useful in various skin disorders like eczema, pimples, and psoriasis etc. Research is going on to study the efficacy of leech in the management of myocardial infraction (where it is used around the pericardium) & stroke as it has got an anticoagulant chemical called Hirudin which resembles drugs like Heparin & Strepto-kinase.

- **Respiratory** – pneumonia, bronchial asthma
- **Cardiovascular diseases** – hypertension and ischaemic disease
- **GI tract** – hepatitis, cholecystitis, pancreatitis, stomach ulcers ENT diseases
- **Paradontosis and other teeth diseases.**
- **Urological diseases**
- **Male sterility**
- **Skin diseased** – neurodermatitis, psoriasis, herpes, eczema
- **Gynaecological disorders** –female sterility, endometriosis, fibromastopathy
- **Hirudo-relexotherapy used by placing the leeches strategically on the reflexogenic**
Points as a “life needle” Skin color – dusky or bluish
Capillary return – brisker than normal
Pinprick response – bleeding should be dark and rapid
History – known problems with veins at operation, e.g. at the site of micro vascular anaestomosis.

In reconstructive surgery, traction or other pressure related changes in tissue tension, changes in blood flow patterns can therefore lead to impaired perfusion, vascular anastomosis concerns and thrombosis can sometimes occur in pedicle flaps, perfusion problems may develop, but imbalances between arterial and venous drainage are more common. Deficient venous return leads to venous congestion (characterised by blue discoloration and the skin becomes increasingly mottled), or in extreme cases; thrombosis following reattachment of the ear post trauma. The microsurgical anastomosis of the hair thin blood vessels of the ear is extremely challenging. Venous insufficiency sometimes occur and leeching can sometimes provide a good outcome.¹²

CONTRAINDICATIONS OF LEECH THERAPY. [¹³,¹⁴]
1. Absolute haemophilia.
2. Children.
4. Leukaemia.
5. Anaemia.
6. Arterial insufficiency.
7. Previous exposure to leeches (because of risk for anaphylaxis or allergic reaction).
8. Patient refusal to accept blood transfusions.
9. Patient refusal to undergo leech therapy.
10. Unstable medical status.

Biochemistry of leech saliva¹²
During the process of feeding, leeches secrete a complex mixture of different biologically and pharmacologically active substances into the wound. Components of medicinal leech saliva and their effects in the host’s body are given in the following table.
### Active Substance | Effect on the Host
--- | ---
Hirudin | Inhibits blood coagulation by binding to thrombin
Calin | Inhibits blood coagulation by blocking the binding of von Willebrand factor to collagen. Inhibits collagen-mediated platelet aggregation
Destabilase | Monomerizing activity. Dissolves fibrin. Thrombolytic effects
Hirustasin | Inhibits kallikrein, trypsin, chymotrypsin, and neutropholic cathepsin G
Bdellins | Anti-inflammatory. Inhibits trypsin, plasmin, acrosin
Hyaluronidase | Increases interstitial viscosity. Antibiotic
Leech-derived Tryptase inhibitor (LDTI) | Inhibits proteolytic enzymes of host mast cells
Eglins | Anti-inflammatory. Inhibit the activity of alpha-chymotrypsin, chymase, substilisin, elastase, cathepsin G
Factor Xa inhibitor | Inhibits the activity of coagulation factor Xa by forming equimolar Complexes
Complement inhibitors | May possibly replace natural complement inhibitors if they are deficient
Carboxypeptidase A Inhibitors |Increases the inflow of blood at the bite site
Histamine like substances | Vasodilator. Increases the inflow of blood at the bite site
Acetylcholine | Vasodilator
Anesthetics subsctance | Anesthetic

➤ **MEDICINAL USES OF LEECHES.**

In medicine, leeches have recently been rediscovered and are used by maxillofacial and other micro surgeons to aid salvage of compromised venous engorged tissue, including free and pedicled flaps, and amputated digits, ears and nasal tips. Evidences suggest that the survival of a compromised, venous - congested flap is improved by early application of a leech\[15\]. They
provide an effective means to reduce blood coagulation, relieve venous pressure from pooling blood (venous insufficiency) and in reconstructive surgery to stimulate circulation in reattachment operations for organs with critical blood flow. Leech therapy is helpful in cases of avulsion injuries to the face where arterial blood supply is present, but venous outflow is lacking. The soft tissue sparing effect provides adequate results [16]. A case series on 38 patients of digit and hand amputations, showed a high success rate post leech therapy with no functional deficits. Leech therapy has also been used in cosmetology, treatment of frostbites, essential hypertension and different types of arthritis [17]. A German study on 51 patients of knee osteoarthritis, showed a greater decrease in pain (seven days post leech therapy), as compared to control who received topical diclofenac application [18].

- Leeches in cancer

Post surgery, a patient of basal cell carcinoma, underwent nine months of leech therapy and showed good results in terms of attaining blood circulation across the flap. Masaki I et al., reported using medical leeches to relieve venous congestion of a free forearm flap after reconstruction in a patient with intraoral carcinoma [19].

The salivary gland secretions of the Mexican leech, Haementeria officinalis has antimetastatic activity. Its saliva contains a protein called antistasin which prevents lung cancer colonization. There exist platelet aggregation inhibitors, anticoagulants, and the antiproteolytic enzymes in the secretions. Saliva of another tropical leech, H. Manillensis, showed antiproliferative activity in vitro against small cell lung cancer (SW1271).

- Leeches in diabetes

One of the peripheral vascular complications of diabetes is gangrene. The wild leech species Whitmania pigra has been used by the traditional Chinese therapists to augment blood flow to the distal parts of the body and to alleviate coagulation disorders, owing to the anticoagulant activity of the aqueous and alcoholic extracts of the body of this species [20].

- LEECH THERAPY IN DENTISTRY

As early as in 1817, Thomas Bell treated a case of an oroantral fistula with facial swelling with six leeches "applied to the face" [21]. Chapin A Harris in 1839 used leeches on gums for drainage of an abscess. He used tubes for application of leeches to the gingiva [22]. Spencer Bate in 1854 treated grossly carious maxillary central incisor using a leech attached to gingiva [23]. Leeches were used in the treatment of many pediatric conditions, in the treatment of the purported symptoms caused by teething [24].
Reports exist in literature stating the benefits of leech application in dental abnormalities. The bloodletting by leeches had been used as an adjunct in the management of severe postoperative macroglossia, besides the common treatment method. 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 inflammation \cite{20,25}. Leeches drain the inflammation at the site of abscess. Anticoagulating agents increase blood flow in the gums, eliminating toxins, increasing nutrition at the affected area. The antibacterial components in leech saliva reduce bacterial growth. Hirudotherapy has also been used in root canal treatment\cite{26}

\textbf{COMPLICATIONS}

Leech therapy is generally recognized as a relatively safe and well tolerated treatment modality. Slight localized itching of the bite site persist for few minutes to several hours and up to 3 days, is the most common adverse effect (37.3\%-75\%) of leech therapy. Symbiotic bacteria such as Aeromonas hydrophilia, Aeromonas vronii and Aeromonas media, living in the intestinal tract of the leech may cause infections in the patients, whose flaps and replanted digits are treated with leeches. In a retrospective study at Ghent University hospital Belgium, bacteriological culture of postoperative wound infections related to treatment with medicinal leeches, was performed on 17 of 47 patients (36.2\%). Aeromonas was frequently isolated (18.5\%). The excess bleeding after leeching can be of concern and transfusion may needed, especially in patient who suffers from anemia or for those taking anticoagulant or platelets inhibiting drugs. Other than these complications hypotension and vaso-vagal attack, transmission of infectious diseases are also reported in some patients.\cite{27}

\textbf{CONCLUSION}

Leech therapy, can be safely and effectively used to evacuate blood and morbid humours from deeper tissues and in diseases like psoriasis, chronic ulcers and eczema. Leech therapy can produce better results as a mono or an adjunctive therapy in diseases like angina pectoris, coronary thrombosis, hypertension, atherosclerosis, varicose veins and in many surgical and traumatic conditions.

\textbf{REFERENCES}


