

HIRUDOTHERAPY- A HOLISTIC NATURAL HEALER: A REVIEW

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ABSTRACT

In recent years an increasing number of people are looking into alternative treatments concerning their health conditions because they are either unsatisfied with the side effects of their current medication and treatment or because there is no adequate treatment available for them in conventional medicine. Application of Medicinal leech is one of the leading alternative & complementary modalities in the World. Detoxification, rejuvenation and blood purification with preventive hirudotherapy became a very popular form of natural healing. The review article has been prepared doing a literature review from the world wide web and pubmed/medline.

KEYWORDS: Leech; hirudotherapy; detoxification

INTRODUCTION

Nazriya Akhlaat (Theory of Humours) is the basic concept of unani system of medicine. This concept was given by Hippocrates, which supposes the presence of four body fluids- Balgham (phlegm), Safra (bile) Dam (blood), and Sauda (black bile) known as Akhlaat (Humours). As every person is supposed to have a unique humoral constitution, which represents his healthy state with a specific Mizaj (temperament), the Mizaj of a person is expressed as Damwi (sanguine), Balghami (phlegmatic), Safrawi (Choleric) and Saudawi (melancholic) according to the preponderance in the body. As long as these humours exist in normal quantities and qualities and in the normal region of the body, the healthy state of an individual is maintained, but imbalance to the constitutions or changes in the

quantity and quality of these humours result in diseases.^[1,2] In this system of medicine, the basic principle of treatment is Ilaj bil zid i.e treatment is in contrast to nature and Mizaj of the disease there are four different methods of treatment viz; Ilaj bil Tadbeer (Regimental therapy), Ilaj bil Ghiza (Dietotherapy), Ilaj bil Dawa (Pharmacotherapy) and Ilaj bil Yad / Jarahat (Surgery).^[3,4] Aelius Galenus (AD 129-200) a prominent physician and philosopher and the most accomplished medical researcher of the Roman era who practiced blood letting extensively and introduced blood letting to Rome. His theories dominated and influenced Western medical science for well over a millennium. Of the four humours, Galen believed that blood was the dominant humour and the one in most need of control. Romans were the first to use the HIRUDO name for leeches.^[5] Leech has been historically documented in our literature from the very past and is recognized as both, a parasite and a therapeutic agent.^[6] For centuries, leeches were the common tool of physicians, who believed that many diseases were the result of imbalance in the body that could be stabilized by releasing blood.^[4] Blood letting still persisted and was even recommended by Sir William Osler in the 1923 edition of his textbook The Principles and Practice of Medicine. In the second half of the 20th century leeches refound an important role in medical practice and leeches are now used extensively by reconstructive surgeon's needing to remove stagnant blood from a flap or reattached limb. In the Act of June 28, 2005, the Food and Drug administration (FDA) cleared for the first time the commercial marketing of Medicinal Leeches for medicinal purposes and determined that leeches are medical devices

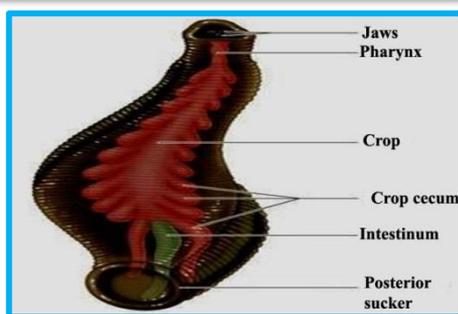


Fig. 1: Structure of leech



Fig. 2: Hirudo medicinalis

because they meet the definition of a medical device. Medical research and the use of leeches never stopped in some parts of the world, especially in Russia. So it is little wonder that Russia achieved the highest level in overall research on medicinal leeches and became a biggest producer of *Hirudo Medicinalis* in the World.^[5] Contemporary leech therapy was pioneered by the surgeons, M Derganc and F Zdravic, who elucidated the use of leeches in tissue flap surgery in which a flap of skin is freed or rotated from an adjacent body area to cover a defect or injury. Their rationale behind the use of leeches was based on a unique property of the leech bite, namely, the creation of a puncture wound that bleeds for hours. Today medicinal leeches are used in the treatment of various diseases such as thrombophlebitis, hypertension, varicose ulcer, skin and musculoskeletal diseases.^[7-10]

LEECH

Linnaeus in 1758 AD used the term "Leeches (Euhirudinea)". They are related to the phylum Annelida, class Clitellata. In general, early studies classified leeches into 4 subclasses, 3 orders, 10 families, 16 subfamilies, 131 genera and more than 696 species.^[11,12] The word "leech" is a derivation of the Anglo-Saxon *loece*, meaning "to heal." The physician was called a "leech" and his therapeutic book a "leechdom." Actually, the leech is an: "aquatic worm with a flattened body, tapering toward each end, and terminating in circular flattened discs, the hinder one being the larger of the two."^[13] Leeches have segmented bodies like an earthworm, but unlike earthworms they are slightly flattened rather than round. They have a sucker at the head and the tail end and the one at the head surrounds the mouth.^[14] Leeches have two suckers, one on either extremity. The posterior suction cup helps it to move on dry surfaces and in attaching to its host; the anterior

suction cup harbors a mouth and three sharp jaws. Each of the three jaws has 100 teeth, for a total of 300 teeth (Fig. 1).^[15] Leeches live in shallow muddy pools and ponds with plenty of waterweeds. When hungry, they attach themselves to a passing animal, break the skin with their jaws, and inject a special chemical that prevent the blood from clotting and reduces any pain. They then suck the blood of the host until they are full, when they withdraw their jaws and drop off into the water. They can consume 15 grams of blood - ten times their own body weight, before they are full, but they only need to feed every six months.

Leeches suck the blood in two ways:

- By using a leech proboscis to puncture the skin.
 - By using three jaws and millions of tiny teeth.
- Leeches are hermaphrodite, having both male and female parts, but they still need to come together to mate with each other. After mating, 15-50 eggs are laid in a spongy case or cocoon, above the waterline often under stones. The eggs hatch in 3-5 weeks and the young leeches need two seasons of feeding before they are ready to breed themselves.^[14,16]

Leeches are divided into following groups on the basis of feeding habits:

- **Predacious leeches** - Predacious leeches are predators of many invertebrates.
- **Sanguivorous leeches** - Sanguivorous leeches are those leeches that feed on the blood of vertebrates along with human.

Leeches generally suck 2-20 ml of blood within 10-30 min, then drop-off spontaneously after being completely engorged with no immediate desire of more feeding. From therapeutic point of view leeches are classified by Unani scholars as follows:

- **Poisonous leeches** - Leeches with long head,

black, grey or green colour are described as poisonous.

- **Non poisonous leeches** - Leeches with thin tiny head, emerald green colour, tiny and rounded like rat's tail are described as non poisonous leeches.^[17-22]

There are about 45 species that belongs to 22 genera in India. *Hirudo medicinalis* (Fig. 2) is most commonly use for medicinal purpose. Other *Hirudo* species sometimes used as medicinal leeches are *H. orientalis*, *H. troctina*, *H. verbana*, *H. manillensis* or the Asian Medical Leech as *Hirudinaria granulosa*. Beside these *Macrobdella decora* or the North American Medical Leech is also used up.^[4,15]

MECHANISM OF ACTION

Leech therapy works upon the following two principles of:

- **Tanqiyae Mawad** (Evacuation of morbid humours)
- **Imalae Mawad** (Diversion of humours)

Tanqiyae Mawad - **Tanqiyae Mawad** 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

Imalae Mawad - **Imalae Mawad** refers to the diversion of the morbid fluids from the site of affected organ to the site where from it is easily expelled from the body tissues.^[3,23,24] Various research studies has proved that, the efficacy of leech therapy lies not in the amount of blood that leeches ingested, but also in the anticoagulant enzymes of the saliva that allow blood to flow from the bite after the leech is detached.^[10,25] The mechanism of action appears to be secretion of biologically active substances from the salivary gland of the leech on to living organism.^[26]

Research shows that leech saliva contains mainly peptides and proteins, as well as further small organic molecules.^[27] The most common found is hirudin, a substance which oppresses the process of blood clotting. Secretions from leeches salivary glands also contain anti-inflammatory, bacteriostatic and analgesic action. These eliminate microcirculation disorders and restore the damaged vascular permeability of tissues and organs, eliminate hypoxia, reduce blood pressure, increase immunity, increase the bioenergetic

status of the organism. Secretions from salivary glands of medicinal leeches also block the attachment of thrombocytes and this completely suppresses their aggregation on the surface of collagen. In this way saliva secreted by medicinal leeches has direct influence upon cellular and plasma factors associated with blood clotting. Stagnant blood pooling in the wound can be lead to increase venous pressure, this may inhibit the flow of fresh oxygenated arterial blood from entering the area and supplying the wound with oxygen and nutrients. By reducing venous blood using hirudotherapy, blood pooling pressure can be reduced in order to save limbs or flaps. Leeches are extremely well suited for this process since their saliva contains important biochemical substances including vasodilators, anticoagulants and anesthetics. Saliva of leech contains following bioactive substances:

Hirudin: It is a potent anticoagulant it binds to the thrombin and inhibits the coagulation of blood.

Calin: It also acts as anticoagulant. It inhibits the blood coagulation by blocking the binding of von willebrand factor to collagen- mediated platelet aggregation and can last up to 12 hours.

Hyaluronidase: It acts as spreading factor. It helps in penetration and diffusion of pharmacologically active substances into the tissues, especially in cases of joint pain and also has antibiotic properties.

Destabilase: Destabilase has monomerizing activity. It dissolves fibrin and has thrombolytic effects.

Bdellins: It inhibits trypsin, plasmin, acrosin and produces anti-inflammatory effect.

Acetylcholine: Act as vasodilator.

Histamine-like substances: Act as vasodilator.

Eglins: Has anti-inflammatory property. They inhibit the activity of alphachymotrypsin, chymase, substilisin, elastase, and cathepsin G.

Factor Xa inhibitor: It inhibits the activity of coagulation factor Xa by forming equimolar complexes (very important role during the treatment of Osteo-arthritis and Rheumatoid arthritis).

Carboxypeptidase-A inhibitors: It increases the inflow of blood at bite site.

Tryptase inhibitor: Inhibits proteolytic enzymes of host mast cells.^[15,26,28]

Therapeutic Properties Hirudotherapy

- Common reflexogenic: Hypotension
- Bleeds: Immunopotentiating
- Internal decongestion: Bacteriostatic
- Anticoagulants: Anti - inflammatory
- Protective antithrombotic: Local anti - edema
- Thrombolytic: Analgesic
- Removal of microcirculation disorders: Antiatherosclerotic
- Anti - ischemic: Elimination of abnormal interactions between the system.^[16]

EQUIPMENTS FOR LEECH THERAPY

1. Ideally a separate Leech therapy room is preferred.
2. Leech therapy room should be well equipped with following:
 - Patient bed
 - Separate tanks for storage of leech
3. The dressing trolley having gloves, gauze pieces, Normal saline, blood pressure instrument, emergency medicines.
4. Adequate number of sterile tray for cleansing of leech, cleansing material like turmeric powder etc. dressing materials

PROCEDURE OF LEECH THERAPY

Leech therapy is performed under following procedures:

- Preparation of patient
- Preparation of leech
- Main Procedure of leech therapy
- Post operative care

PREPARATION OF PATIENT

Hirudotherapy application is based on individual approach for each patient, patient's diseases, age, weight, condition and many other aspects that are analyzed by the hirudotherapist before the session begins. The older the disease is, the longer it takes to heal it, and more series of hirudo-complexo-therapy (or other methods) are required, however no more than 3 times per year. Series of minimum 3 up to 8 treatments (in one series) are required within 2-3-4- or even 6 days interval and have to be completed by the patient in a timely fashion. Select the suitable patient for the leech therapy. Rule out the coagulatory disorder like haemophilia with help of routine blood investigations. Precautionary measures should be taken while handling the anaemia, diabetes, hepatitis, HIV patients. Ask patient to take light semi-solid diet before the procedure.

The patient should not use showering gel, lotions, etc. on those skin portions, on which the leeches are going to be applied. Application area should be thoroughly cleaned with sterile distilled water so that leech can stick to. For the treatment, the skin of the patient must be dry and warm. Hirudo medicinalis are not attracted to a cold skin.

PREPARATION OF LEECH

Choose fresh leech from the tank or jar and drop it in a tray or bowl filled with clean water. Fine turmeric & triphala powder is mixed in it and observe that an inactive leech becomes highly active & runs all around the tray immediately after sprinkling of the powder which indicates its carving for food.

MAIN PROCEDURE

Now, hold the leech at site with fingers & apply directly to the skin, 5- 10 leeches are applied at a time depending upon the necessity. As leeches start sucking the blood, cover them with wet gauze and pour cold water on them from above time to time. This makes leech comfortable during sucking. If leech does not catch the site by its own, in such condition a small prick induced bleeding may be required so as to facilitate the sucking procedure. The leech when once starts sucking the blood, elevates its neck, and fixes its head to the supporting point of skin. One can observe wave like movements indicating sucking of blood. When leech becomes fully satisfied with its food, it leaves off the skin of the patient & drops itself down and if not then the patient may feel itching sensation which indicates impure blood from that spot is no more available for the leech. In such a case, a little turmeric powder is placed on the sucking point of the leech & immediately the leech takes away its mouth from that point.

POST OPERATIVE PHASE

Now remove the leech from the site. Clean the site with help of normal saline or savlon and place the turmeric powder at the bleeding site. Bandaging is done to arrest the bleeding. Sometimes the oozing from the site does not stop, in such cases wound can be sealed with the help of tincture benzene. Sips of Lime water, Soup or Glucose water can be offered to the patient. Patient is allowed to sit for some time before leaving the place.

POST OPERATIVE CARE OF LEECH

Keep the leech in an empty tray and place the turmeric powder on its mouth to induce the vomiting. Immediately after this one may find jets of black coloured blood being emitted by the Leeches. After this the Leech is again washed in clean water. Transfer the leech in jar starving for seven days.^[5,6,14,29]

LEECH IN MEDICINE OSTEOARTHRITIS

Contents present in saliva blocks steps involving in pain by contracting cytokines with anti inflammatory agents in it, in this way it produces the analgesic effect. Tryptase inhibitor present in the saliva of leech also suppresses mast cell mediated inflammatory reactions. Eglin inhibits the neutrophils activity and act as potent anti-inflammatory agent.^[30] A non randomised controlled pilot study was done by Michalsen et al in 2001 and 2002 to find out the efficacy of leech therapy as an adjunctive treatment in 16 patients. These patients were hospitalized for two weeks with osteoarthritic knee pain of at least 6 months duration. 10 patients were treated with single leech therapy application along with conventional treatment and 6 patients received only conventional treatment. The comparison of these two groups showed that this therapy induce more rapid pain relief within three days of post application. A clinically relevant and significantly superior improvement persists after 4 weeks. No adverse reactions are observed.^[31,32] A case of elderly women suffering from osteoarthritis in her knees was reported by Keut and Warning in 2008. The patient has not responded well to various types of analgesics and she was unable to walk because of pain. After one leech therapy session her pain had declined to the extent that she was able to begin physiotherapy exercises. Additional analgesic medication (Metamizol) further improved her condition. No serious adverse reactions were observed. It is also proved by several studies that hirudin (bioactive substance present in the saliva of leech) has also reduced the synovial inflammation in cases of arthritis by inhibiting DING protein, a derivative of synovial stimulating protein acting as auto antigen in rheumatoid arthritis cases.^[33,34]

VENOUS CONGESTIONS

Venous congestion is a common complication of traumatic injuries and reconstructive surgery.

Venous congestion occurs when arterial inflow is greater than venous outflow. When venous outflow is obstructed by clotting or disruption of veins, venous pressure increases. Prolonged elevated venous pressure results in distention, edema, stasis, ischemia and cellular death. Restricted blood flow and venous stasis may cause variety of symptoms like pressure sensation, pain and feeling of swelling. Leeches increase tissue perfusion by actively withdrawing congesting fluids and passively by promoting bleeding. Leech therapy increases oxygenation of involved tissues, and allows time for neovascularization and thrombolysis.^[35-37] Following properties of leech saliva makes the blood thin that allow the blood to flow freely in the veins:

- Saliva of leech contains certain enzymes that act as anti coagulating agent.
- It also contains the enzyme that helps in breaking the thrombi.
- Vasodialting property of leech saliva also provides a better flow to the blood.^[38]

CANCER AND LEECH THERAPY

With regard to cancer and metastasis therapy, many researchers delineated the effective usage of leech saliva and leech salivary gland extract as an anti-metastatic agent. It has been outlined that salivary gland extract from *Haementeria ghilianii* and *Haementeria officinalis* inhibited the metastatic colonization of lung tumor cells which were injected intravenously into the experimental animals.^[13] Other research described a booming synthetic *hirudin* preparation as an efficacious metastasis inhibitor of a wide range of malignant tumor cells, such as pulmonary carcinoma, osteocarcinoma, breast carcinoma, leukemia, etc.^[14] Recently, intensive researches led to the isolation of a protein named *ghilanten* from the leech *H. ghilianii* salivary gland extract with factor Xa inhibitory and anti-metastatic activities.^[15] Merzouk A *et al.*, in 2012 studied the anticancer effects of Medical Malaysian Leech Saliva Extract (LSE) and they concluded that the salivary gland secretion obtained from the medicinal Malaysian leech, *H. manillensis*, had an antiproliferative activity against small cell lung cancer besides to its positive synergism with Carboplatin.^[39] Kalender *et al.*, in 2010 reported the efficacy of leech therapy for symptomatic

relief of cancer pain. They reported a case of severe pain related to advanced stage cancer successfully treated by self-applied leeches. A 62-year-old male patient with synchronous renal cell carcinoma and leiomyosarcoma was admitted with severe pain in the lumbar region. The pain was refractory to radiotherapy, and systemic and epidural analgesic infusion. Two months the patient came to the clinic in good condition free of pain. The patient reported outpatient self-treatment with seven leeches to the lumbar region in the interim that resulted in complete healing of pain. This was the first report indicating possible activity of leeches in cancer pain.^[40]

DIABETES MELLITUS

Diabetes itself caused the failure of pancreas to produce enough insulin. Diabetes is mostly found in type 1 and 2. Type 1 diabetes is usually in early childhood, where there is thinning of absolute insulin. While type 2 diabetes, usually attacks in adulthood around the age of 45 years or more, in which insulin production occurs, but the amount of insulin produced is not sufficient.^[41]

Mohammed AA *et al.*, conducted a study to evaluate the antihyperglycemic activity of leech saliva obtained from *Hirudinaria manillensis*, along with examining its ability to prevent the experimental induction of DM in an animal model. They concluded that the salivary gland secretion of leeches (LSE) has an anti-hyperglycemic effect against type-1 like diabetes mellitus. It was shown that subcutaneous injection of LSE collected from the medicinal Malaysian leech, *H. manillensis*, was sufficient to obtain regular glycemic control, with no fatal post-injection hypoglycemic conditions during the study period. Moreover, it was found that both LSE and insulin at lower doses had a synergistic antihyperglycemic activity.^[42] In diabetes, fingers and foot care in people is very important and because diabetes may slow blood circulation, where blood sometimes not able to fully penetrate the capillaries, the body can not heal a small wound, or even worse, necrosis or tissue death.^[41]

Amarprakash reported a case of diabetic foot ulcer. The patient was advised to continue anti diabetic medicine along with weekly application of leech around ulcers which was followed by dressing with Nimb-Haridra oil. The ulcers healed completely within 30 days and leech therapy proved very effective. The probable mechanisms

of actions reported by the author were as following:

- The anti-inflammatory action on nerve following the leech therapy is due to the presence of Bdelins and Eglins in saliva which correct diabetic neuropathy.
- Leech therapy improves blood circulation and reduces congestion due to presence of Caboxyptidase A inhibitor, Histamine like substance acetylcholine so it corrects diabetic microangiopathy.
- The presence of vasodilator constituents in saliva of leech improves the blood circulation which corrects ischemia due to diabetic atherosclerosis.^[14]

VASCULAR DISORDERS

Cardiovascular disease has long been a main indication for leech therapy. The prominent doctor Nickolay I. Pirogov of Russia was among the first in modern history to treat heart disease with leeches in the 1800s. Good results have been seen even in cases of sclerotic changes in blood vessel walls.^[43] The saliva of leech contains certain substances like hirudin, thrombin inhibitors which have inhibitory effect on free as well as clot bound thrombin. There are some other thrombin inhibitors which are found in different species. These thrombin inhibitors are summarized in Table 1. Since the common antithrombotic agents used in therapy (heparin, aspirin, coumarin derivatives) do not always have the desired effectiveness or cause complications, hirudin and its analogs show promise as novel therapeutic agents and are excreted in unchanged form in the urine. Hirudin is more potent than the heparin and it prevents the ischemic events in cases of unstable angina and deep venous thrombosis. Hirudin is a drug of choice for the patient with disseminated intravascular coagulation syndrome because it produces a direct inhibitory effect on thrombin without endogenous cofactor that is anti thrombin III.^[44-49] Factor Xa is also an important factor which plays a major role in the body haemostasis. Factor Xa helps in conversion of prothrombin in to thrombin which promotes the coagulation process of the blood. The saliva of leech contains factor Xa inhibitor which inhibits the coagulating effect of factor Xa. Many types of factor Xa inhibitors are found in different type of species. Some of

Table 1: Different thrombin inhibitors produced by various species

Species	Thrombin Inhibitors
H. medicinalis	Hirudin
H. manillensis	Bufrudin
Haemadipsa sylvestris	Haemadin
H. nipponia	Granulin
Theromyzon tessulatum	Theromin

Table 2: Different Factor Xa inhibitors produced by various species

Species	Factor Xa Inhibitors
T. tessulatum	Therostatin
H. ghiliani	Ghilanten
H. depressa	Lefaxin

important species are as on Table 2. Several fibrinolytic enzymes are also isolated from various species like hementin from H. Ghiliani, hementerin from H. Depressa which results in cleavage of fibrinogen leads to early blockade of coagulation cascade.^[50-52]

LEECHES: A ROLE IN DENTISTRY

Thomas bell in 1887 was first who reported the views of hirudotherapy in dentistry, he treated a case of oro-antral fistula and facial swelling with help of this therapy. He used 6 leeches applied to the face. Harrish in 1845 used the leeches on the gums for the drainage of periodontal abscess.^[53] Smeets IM in 1995 reported a case of severe macroglossia, following intraoral surgery, causing respiratory distress. Because conventional therapy appeared inadequate, leeches were used and proved an efficient method of reducing this life-threatening swelling of the tongue.^[54] Leeches can be applied to the site of the abscess where they will drain it. Anticoagulation agents increase the blood flow in the gums, helping to eliminate toxins and allow delivery of nutrients to the affected area. These anti-coagulation agents also dissolve the blood clots that could be developed in the gums. The saliva of leech also contains antibacterial components that assist in reducing bacterial growth. The of hirudotherapy have been used to treat various inflammatory processes in the oral cavity including periodontitis (chronic inflammatory process affecting the tissues surrounding the tooth), gingivitis (inflammation of the gums, abscess), and inflammation of the periosteum (covering of the tooth's bony socket) because of its anti-inflammatory, immunostimulant, and analgesic effects.^[55] The number of medicinal leeches

prescribed for periodontal treatment depends upon the stage and form of gingivitis and periodontitis and varies from 3 to 5 specimen successively applied to the affected gingiva in mild cases, to 5-7 leeches in severe form of periodontal disorders. In this treatment leeches are left on the gums for 10-15 minutes using a special application set which is suitable for application of leeches to oral mucosa. In cases of chronic generalized periodontitis use of medicinal leeches followed by application of biosoluble "piyavit" gel based on extract of H. medicinalis showed local analgesic and anti-inflammatory effect. Medicinal leeches has been also be used in cases of oral lichen planus in advance form. Use of conventional medication supplemented by daily application of 1-2 leeches on perifocal sites of oral ulcers during 7-10 days resulted in reduction of oral ulcers epithelialization period by 2-3times as compared with conventional topical steroid. Leeches can also be used in cases of Melkerson Rosenthal syndrome that is a neurological disorder characterized by recurring facial paralysis, swelling of lips and desquamative glossitis. 2-3 specimens should be applied for 10 - 15 minutes on swelling area of lips, oral mucosa and tongue daily for 4 to 5 days will be beneficial.^[53] Abal'masov DV treated 20 patients using hirudotherapy suffering from chronic inflammatory and dystrophic diseases of the salivary glands (sialadenitis, sialadenosis). Positive clinical shifts were observed in 50% patients; the most pronounced therapeutic effect was observed in patients with sialadenosis. Author concluded that hirudotherapy was ineffective in patients with chronic parenchymatous parotitis paralleled by Sjogren's

syndrome.^[56]

ADVANTAGES OF HIRUDOTHERAPY

To reduce the nidus of inflammation in the blood requires more concentration of blood which can lead allergies and strikes several reactions to liver and kidney. If this condition is beneficial it restores blood circulation in nidus of inflammation, improve immune protection and regeneration of tissues. Hirudin has both bacteriostatic and bactericidal properties which is a important component of leech saliva. Hirudotherapy helps in lung ventilation and unloading of heart. Hirudotherapy can be used for arterosclerotic defect of vessels in respective of primary localization of artherosclerosis because leech saliva contains lipotropic enzymes. The secretion of saliva - penetration of enzyme galuronidase is capable of inactivating the action of galuron acid which is cementing substance for conjunctive tissue.^[26]

INDICATIONS

- 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, can be effectively used in conditions like long standing varicose ulcers, filariasis, post-operation and skin grafting lesions.
- It is used in Arthritis, Sprain or spasm to relieve the pain, inflammation & discomfort symptomatically.
- Used in Abscess, Cellulitis, Thrombophlebitis and Varicose Veins
- Useful in third degree thrombosed prolapsed Piles.
- Useful in Atherosclerosis of the limb as it improves circulation.
- Jaloka siddha oil is used locally to treat hyper pigmentation.
- Periodontosis and other teeth diseases.
- Skin diseases – neurodermatitis, psoriasis, herpes, eczema.
- Hirudo- reflexotherapy used by placing the leeches strategically on the reflexogenic points as a “life needle”.
- Gynaecological disorders – female sterility, endometriosis, fibromastopathy.
- Plastic and reconstructive surgery.

- Eye diseases, including cataracts, glaucoma, traumatic injuries and inflammation.
- GI tract – hepatitis, cholecystitis, pancreatitis, stomach ulcers.
- Respiratory disorders - Asthma, acute rhinopharyngitis and spasmodic coryza.^[15]

CONTRAINDICATIONS

Leech therapy is contra indicated in following medical conditions and diseases:

- Hemorrhagic diseases
- Absolute haemophilia
- Pregnancies
- Severe anemia
- Hypotension
- General fatigue
- Allergy to leech
- Active tuberculosis
- Mental disorders during acute episode
- High temperature
- Immuno compromised patients.
- Severely ill & bed ridden and in case of extremely fearful patients.

SITES CONTRA INDICATED FOR LEECH APPLICATION

All around the liver, spleen, stomach, intestine and buttock. In tropical areas, leech therapy has been prohibited as the site attachment of leech may become infected.^[21,24]

COMPLICATIONS

- Prolonged bleeding.
- Allergic reactions
- Bacterial infections^[3]

CONCLUSION

Hirudotherapy is relatively simple inexpensive and indispensable when it comes to many chronic disease and perform as good as, if not better than some conventional medical procedures which may be more costly, have higher risks of complication and all usually accompanied by synthetic pharmaceutical drugs that can have nasty side effects. Hirudotherapy is not only a surface treatment but also a complex process that should be regarded as holistic treatment for whole body, rather than a mechanical bleeding in one spot that benefits only a local issue.

CONFLICT OF INTEREST & SOURCE OF FUNDING

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