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Leech Therapy (Jalaukavacharana) in Ayurveda: A Scientific Review

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ABSTRACT

Leech therapy is a novel gift of Ayurveda to the modern world. Modern medical science is now fully developed and most acceptable medical science across the world but still it is struggling in the management of various chronic disorders like chronic eczema, psoriasis, osteoarthritis, rheumatoid arthritis, gout, sciatica, inflammatory reactions, acne vulgaris, varicose veins, rheumatic diseases, Ischemic heart disease, complicated wounds, boils and abscesses, thrombosis (blood clot), alopecia etc. Leech therapy can be a safe and better alternative to manage such disorders. Medicinal leech therapy or Jalaukavacharana is used in a variety of inflammatory conditions. Its mode of action depends on the injection of leech saliva into patient's tissues during the process of blood sucking. Leech saliva contains numerous bioactive constituent which possesses anti-inflammatory, analgesic, thrombolytic, antioxidant, vasodilator, anti-coagulant and blood circulation enhancing properties. In this present review, leech therapy (Jalaukavacharana) in ancient ayurvedic sculptures has been discussed in the light of modern medical science.

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INTRODUCTION

Hirudotherapy or Leech therapy is an ancient bloodletting technique firstly described in Ayurveda by the name of Jalaukavacharan [1]. Ancient history suggests that Lord Dhanwantary evolved in this world after Samudra manthan with Jalauka (Leech) along with pitcher filled nectar in his hand. This shows immense importance of Leech in therapeutics. Bloodletting can be done by Shriga, Alabu, Jalauka and Siravedh, out of them, Jalaukavacharan (Leech Therapy) is the mildest and safest methods used for blood-letting [2]. For this reason, it is called the best method of Raktamokshan. Nowadays Jalaukavacharana or leech therapy has gained greater attention worldwide, because of its medicinal values. Leeches are blood sucking invertebrate blogs to family Annelida. In Sanskrit, it is known as Jalauka because of their water-loving nature also they dwelling and taking their nutrition only from Jala (Water) [3]. A leech contains various bioactive substances, which have potent anti-inflammatory, analgesic, anaesthetic properties etc. In 1884, Haycraft discovered hirudin which is the main anti-coagulative substance in leech's saliva[4]. Now scientists have discovered about 100 bioactive constituent in leech saliva, still this number increasing day by day.

According to Ayurveda, all the Physiological functions of the body will be governed by Doshas, Dhatus and Malas. Susruta said "Dosha Dhatu Mala Mulam Hi Shariram", but out of three Dosha are most important one these are namely, Vata, Pitta, and Kapha. Vitiation of these Doshas leads to the manifestation of any disease. Apart from this Acharya Susruta also considered Rakta as an integral part of the body. Vitiation of Rakta resulting in the manifestation of different Skin disorders (Kustha), Joint disorders (Sandhigata Vyadhi) and different Ischemic disorders (Infarctions). So, removal of vitiated rakta is very necessary for the complete cure of these diseases that is known as Raktavisravan or Raktamokshan (Bloodletting) in Ayurveda. Acharya Susrutadescribes three important measures for Rakta mokshana these are, by Shringa in the case of Vata predominance, by Jalauka (Leech) in Pitta predominance and by Alabu in Kapha predominance. Out of three blood letting by Jalauka is known as Jalaukavacharan. Jalaukavacharan (Leech Therapy) is a method of Raktamokshan. This is the mildest of all the methods used for blood-letting [2]. Jalaukavacharana or leech therapy has gained greater attention globally, because of its medicinal values. The saliva of leech contains numerous

biologically active substances, which have anti-inflammatory, analgesic, anaesthetic properties as well as probable antioxidant effect.

In the present era, leeches have become the center of attraction for the researchers all over the world. Over 100 therapeutic substances are believed to be present in leech saliva of which about [5, 6] anticoagulants have been isolated and studied. Leeches are now-a- days, commonly used in plastic surgery, complicated wounds, abscess and several other surgical conditions. Recent studies have shown its dramatic effect in relieving symptoms of osteoarthritis. Besides these, there are various diseases like eczema, psoriasis, acne vulgaris, rheumatoid arthritis, osteoarthritis, gout, cellulitis, sciatica, inflammatory reactions, blood purification, ischemic heart disease, varicose veins, rheumatic diseases, boils and abscesses, hypertension, thrombosis (blood clot), alopecia and herpes zoster.[7-9]. In this review, an effort has been made to discuss the concept of leech therapy in Ayurvedic and modern perspective.

Leech Therapy in Ayurveda

In Ayurveda Leech therapy known as Jalaukavacharan which forms by the addition of two words Jalauka and Avacharana. The etymological meanings of both the words are following:

Jalauka (Leech)

The term Jalauka can be split into Jala + Oka; i.e. water dwelling animals.

Jala (Water) + Oka (Housing place) = Jalauka

The word Jalauka is a compound word with two components Jala + Oka; i.e. animals having water as its housing place. Another synonym of Jalauka is Jalyau.

Jala (Water) + Ayu (Life) = Jalayu

The word Jalayu is a compound word with two components Jala + Ayu; i.e. animals having water as the life. Considering both etymologies defines a creature of nature whose life and dwelling place depends on upon water (Jala) is called Jalauka.

Avacharana

Avacharana means "Application" So; Jalaukavacharan means the application of Leeches.

Zoological classification of Leech(Jalauka)

Phylum	:	Annelida
Class	:	Hirudinea
Order	:	*H. limnobdella*
Family	:	*Hirudinae*
Genus	:	Hirudinaria
Species	:	*H. medicinalis*

Morphology of Leech (Jalauka)

Leech word first coined by Linnaeus in 1758, there are two species of therapeutic medicinal leeches- *Hirudo medicinalis* & *Hirudo mychaelseni*.This is a segmented worm of *Phylum annelida*.It is abundantly found in freshwater ponds and rivers of India. Sexually leeches are hermaphroditic but require a partner to reproduce. [10] *Hirudo medicinalis* is used because of its maximum blood sucking capacity without any adverse effect at the bite site. [11] *H. medicinals* consists of 102 segments [12]. The leech crawls using a large posterior sucker. [10] Posteriorly, the leech has three jaws arranged in a triradiate configuration that attaches to and bites through human skin and a smaller anterior sucker that is utilized for feeding. [12, 13]. With the help of these suckers, leeches leave a Y-shaped bite mark on the skin surface. A leech can remain 90 minutes to 6 hrs. As it fills with blood .During feeding it can suck 5–15 ml. of blood.

Bioactive Constituents of Leech Saliva

Therapeutic effect of Jalauka (Leech) is the due presence of a different bioactive constituent in Leech saliva. Some major bioactive constituent of Leech Saliva are given below: [14-17]

1. **Hirudin:** Inhibits blood coagulation by binding to thrombin.
2. **Calin:** Inhibits blood coagulation by blocking the binding of Von Willebrand factor to collagen. Inhibits collagen- mediated platelet aggregation.

3. **Destabilase:** Monomerizing activity. Dissolves Fibrin. Thrombolytic effects.
4. **Hirustasin:** Inhibits Kallikrein, Trypsin, Chymotrypsin, Neutrophil Cathepsin G.
5. **Bdellins:** Anti-Inflammatory. Inhibits Trypsin, Plasmin, Acrosin.
6. **Hyaluronidase:** Increases Interstitial Viscosity. Antibiotic.
7. **Tryptase Inhibitor:** Inhibits Proteolytic Enzymes of Host Mast Cells.
8. **Eglins:** Anti-Inflammatory. Inhibit the Activity of Alpha Chymotrypsin, Chymase, Subtilisin, Elastase, Cathepsin G.
9. **Factor Xa Inhibitor:** Inhibits the Activity of Coagulation factor Xa by forming Equimolar Complexes.
10. **Complement Inhibitors:** possibly replace natural complement inhibitors if they are deficient.
11. **Carboxypeptidase A Inhibitors:** Increases the inflow of blood at the bite site.
12. **Histamine-like Substances:** Vasodilator. Increases the inflow of blood at the bite site.
13. **Acetylcholine:** Vasodilator.
14. **Anaesthetics Substance:** Anaesthetic.

Raktamokshana (Blood Letting)

Ayurveda advocates five bio-purificatory methods for treating various diseases in which Raktamokshana viz bloodletting is one of the ancient and important parasurgical procedure described in Ayurveda[18] for the treatment of various diseases. Of them, Jalaukavacharana or Leech Therapy has gained greater attention globally, because of its medicinal values. Jalauka[19] is one of the tools for raktamokshana among shringa, jalauka, alaboo and pracchhan. It is described for the treatment of pitta doshajvyadhi as kustha, vatarakta, vishphota, vidradhi etc. Jalauka used for raktavishravana, is described to occur in cold water [20] and it is of twelve types. Out of which six nonpoisonous leeches can be used for medicinal purpose. Raktamokshana can be done by Jalauka in those who are rich, weak, fearful, sophisticated, old & in the case of ladies and children. This is mildest in all the methods used for bloodletting, for which it is called the best **[2].** Leeches are sheeta in nature so commonly used in pittaj and raktaj disorders **[20].** Leeches first suck the impure blood then the pure so when the patient feels pricking pain and itching over the bite place leech should be removed.

Symptoms of Samyaka Vishravana (Proper Bloodletting)

Feeling of light of the body, mitigation of suffering, the subsiding severity of the disease & cheerful of mind are the symptoms of proper vishravan [21].

Benefits of Raktamokshan

Diseases of the skin, tumors, edema and diseases arising from blood will never occur in person indulging in bloodletting [22].

Selection of Jalauka (Leech)

Out of twelve, only six varieties of non-poisonous leeches are used for medicinal purpose. Sankumukhi type of leech is preferably used for medicinal purposes due to its rapid blood sucking capacity. As per classical description of Ayurveda, the leech neither too long nor too small should be preferred for therapeutic purposes [23].

Storage and maintenance

The leech will survive quite happily in a cool place provided the temp. Does not exceed 15 -20 Leech should be stored in a well labelled container having multiple pores on the top for proper aeration. Avoid direct exposure to sunlight to the leeches. The water of container should be chlorinated and should be replaced after 5 to 6 day. About 50 leeches can be kept in one gallon (4 liter) of water, for best result, we should keep two leeches/ 250 ml of water. If it is not possible to get the chlorinated water then keep the container of water in the open air for a period of time and then use it for storage of leech. It is better to avoid direct exposure of sunlight to the leeches.

Leech Containers

Method of Jalauka Application:

Purva Karma (Pre-Procedure Protocols)

It includes following steps-

I - Proper snehana (oleation) and swedana (sudation) of the patient.

II- Purification of Leech by pouring the Leech in water mixed with turmeric powder.

III- Part preparation – Cleaning of part of the body to which leech is going to be applied.

Pradhana Karma (Main Procedure Protocols)

Before application prick, the skin with a sharp and sterile needle so that drop of blood comes out then applied the Leech through its front end and covers the leech by wet cotton. If the leech is not ready to suck the blood from the body part then application of madhu, Ghrit, or butter should be done.

Step-1

Step-2

Step-3

Step-4

Observation of leech during blood sucking

While sucking the blood following signs appears in the body of leech

a. Gradual distension in the central portion of the body.
b. Itching and burning sensation at the site of bite.
c. Pulsations on the body of leech may be visible.

Removal of Leech

After 30-70 minutes the leech is removed by itself, or by application of turmeric powder on the mouth of leech.

Paschata Karma (Post Procedure Protocols)

Care of wound

After detachment of leech, there is triangular wound created by the mouth of leech. The blood comes out from the wound. The bleeding from the wound is checked by application of tight bandaging with the use of Yastimadhu or turmeric powder.




Emesis of Sucked blood

Induction of emesis the leech that is applied to the lesion undergoes a process of Vamana so that the same leech can be applied next time to the same patient. For the vamana of leech, turmeric powder is applied over the mouth of leech.


The leech vomits out all the blood sucked by it to get purified. Sometimes pressing of Leech from caudal to front end is required for proper emesis. After proper vamana, Leech should be put in fresh water, where it swims swiftly and then settles down. Replace the leech in a clean jar or aquarium.

Precaution during Leech Application:

1. Bleeding and clotting time of the patient should be normal.
2. Gentle handling of leech.
3. Cover the leech with wet cotton.

Indications: Ayurveda

Jalaukavacharan can be used in different ayurvedic diseases like- Vidradhi (Abscess), Gulma (Abdominal swelling), Arsha (Piles), Kushtha (Skin disease), Vatarakta (Gout), Krostruka shirsha (Infective arthritis), Sandhi gata roga (Arthritis), Kantharoga (Goiter), Netraroga (Eye diseases), Granthi (Nodular swelling), Arbuda (Cancer), Shlipada (Filaria), Vidarika (Crackle), Vishadamshtra (Insect bite), Visharpa (Erysipelas), Siroroga (Diseases of scalp), Dantaveshta (Pyorrhea) and Plastic and reconstructive surgery [24].

Contraindications: Ayurveda

Jalaukavacharan should be avoided in following conditions [25]:

- Sarvanga shotha (Generalized oedema)
- Udarroga (abdominal diseases)
- Shosa (Tuberculosis)
- Ksheena (Emaciation)
- Garbhini (Pregnancy)
- Pandu (Anemia)

Indication: Modern Medicine

Nowadays, doctors use leeches for treating abscesses, painful joints, glaucoma, and myasthenia & to heal venous diseases and thrombosis. Medicinal leeches are used in plastic surgery, for improving brain circulation & for curing infertility. Excellent results have been obtained from leech therapy in eczema, psoriasis & alopecia. Leech therapy could be very effective in the following disorders [26-31]:

1. Inflammatory diseases
2. Abscess
3. Different wounds
4. Gangrene and ischemic diseases
5. Venous diseases / varicose vein
6. In plastic surgery / grafting
7. Heart diseases
8. Thrombosis / embolism
9. Rheumatic disease
10. Painful joint (arthritis etc.)
11. Skin diseases – herpes, psoriasis, eczema etc.

Contraindication: Modern Medicine

Leech therapy should be avoided in following conditions [32]:

1. Patient refusal
2. Arterial insufficiency diseases
3. Bleeding disorders

4. Immunocompromised patient
5. Anaemic patient
6. Blood clotting disorder
7. Patients taking medicines like aLarge dose of vitamin E, Aspirin, Heparin, Warfarin, NSAID.
8. Patients taking Garlic, ginger, *Ginkgo biloba* and Ginseng.
9. Allergic reaction to active substances of the leech-like Hirudin, Calin, Hyaluronidase, Egline, Collagenase, Apyrase, Destabilase, Piyavit.

Adverse Effects of Leech Therapy

The leech therapy is very safe procedure, however some adverse effects reported by scientists these are local pain, itching, hypotension, vasovagal attack, haemorrhage, infection, allergic reactions, ulcerative necrosis and transmission of infectious diseases [33-37].

Frequency of Leech application

The frequency of leech application will vary according to disease and severity. Generally, Leech should be applied once in a week up to six sittings. One Leech should be reserved for a particular patient to avoid cross infection.

Biochemical Investigations prior to Leech application

Before leech application, it is necessary to observe some biochemical parameter to avoid any complications and side effect. These parameters are Hb%, TLC, DLC, ESR, LFT, Blood urea, Sr. creatinine, Bleeding time, Clotting time, Prothrombin time, Blood sugar level, HIV, and HbsAg.

Probable Mode of Action of Jalaukavacharan (Leech Therapy)

The saliva of leeches contains a variety of substances such as hirudin, hyaluronidase, histamine like vasodilators, collagenase, inhibitors of kallikrein and superoxide production & poorly characterized anaesthetics and analgesic compounds. Different mechanisms may explain the observed effects. First, various pharmacologically active substances besides the thrombin inhibitor hirudin have been found in leech saliva, such as histamine-like vasodilators, kallikrein and tryptase inhibitors, various other proteinase inhibitors, and anesthetics. Through the

concomitant activity of a further leech saliva component, hyaluronidase, these substances might reach deeper tissue zones. Second, nociceptive activation contributes to chronic pain. Leech therapy could induce pain relief through ant nociceptive effects and counter irritation. However, it is not known to what extent leech bites may induce such mechanisms, and it seems unlikely that reduction of nociceptive input on a single occasion would result in the observed lasting effect [38]. The jaws of the leech pierce the skin so that these potent biologically active substances can penetrate into the deeper tissues. Hyaluronidase (spreading factor), an enzyme in leech saliva, further facilitates the penetration and diffusion of these pharmacologically active substances into the tissues. With the additive effect of hyaluronidase, it is highly probable that the antiphlogistic substances in leech saliva can penetrate deep enough to exert significant effects on periarticular myofascial structures and perhaps even on intra-articular structures and on inflammatory skin conditions like psoriasis [6].

CONCLUSION

Leech therapy or Jalaukavacharan is an ancient ayurvedic bloodletting technique which having the immense potential to treat inflammatory, ischemic and infective disease conditions. Leech saliva contains a number of bioactive constituents which possesses anti-inflammatory, anticoagulant, anaesthetic, vasodilator, anaesthetic, antibiotic and antioxidant properties acting through multiple mechanisms in different disease conditions. Unfortunately, most of the bioactive ingredients are still unexplored and there is only limited knowledge of mechanisms of action of bioactive compounds present in Leech Saliva.Hence, extensive studies are required to find out the exact mechanisms of action of a various bioactive constituent to re-establish the traditional therapeutic potential on scientific ground.

Conflicts of interest

There are no conflicts of interest.

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