



Review Article

ATTAI VIDAL (LEECH THERAPY) IN SIDDHA SYSTEM OF MEDICINE AND THEIR CURRENT CONCEPT IN THERAPEUTIC APPLICATION - A REVIEW

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ABSTRACT

The Siddha system of medicine is an unique traditional system of medicine practiced in Tamil speaking countries particularly India. In Siddha system of medicine the diseases were treated through internal and external medicine. In external medicine, the leech therapy is one which is used to treat various non-surgical and surgical cases. The leeches have been used for therapeutic purposes since their beginning of civilisation. Ancient Indian, Egyptian, Greek and Arab physicians were used the leeches for wide range of diseases such as inflammatory condition, skin diseases, respiratory disorders, eye diseases, cardiac diseases, urinary and reproductive diseases and dental diseases. The leeches are also used as one of the bloodletting methods in Unani, Ayurveda, and Modern science for various clinical conditions. Recently, researches on leech saliva revealed the presence nearly 100 biologically active compounds such as Hirudin, vasodilators, hyaluronidase, anaesthetics, fibrinases, antibacterial, collagenase etc. The above mentioned pharmacological compounds are injected into human body while sucking of the blood and are responsible for the anaesthetic, anti-inflammatory, anticoagulant and analgesic effect of leech application. In current scenario, the leech therapy is used for various diseases including life threatening diseases such as cardiovascular diseases, cancer, etc. in different system of medicine including modern medicine. Leech therapy is used in plastic and microsurgery as a protective tool against vascular congestion in modern medicine. The Scientific studies on leech saliva were proven and support the leech application in Siddha system of medicine.

KEYWORDS: *Siddha, Attaividal*, Bloodletting, Leech therapy, Hirudin.

INTRODUCTION

Siddha system of medicine is one of the Indian traditional systems of medicine formed by saint *Siddhars*. The origin of this system is Tamilnadu and nowadays it spread worldwide particularly Tamil speaking countries such as Srilanka, Malaysia, Singapore etc. In Siddha system of medicine five elements, *Panchaboothangal* namely *vie. Akayam* (Space), *Vayu* (Air), *Thee* (Fire), *Neer* (Water), *Man* (Earth) were playing an important role. These five elements contribute to form the three *Uyirthatthukal* (*Vatham, Pitham, Kabam*), the balance of which is very essential for healthy life. Any changes in these *Panchabootham* will cause changes in three *Uyirthatthukkal* (three humours) results in diseases. *Vatham* is formed by Air and Space, *Pitham* is formed by Fire and the *Kabam* is formed by Earth and Water. These three *Thathus* are perceived as *Naadi*, which is an unique feature of the Siddha system. The existences of these *Thathus* are in the ratio of 1:1/2:1/4 respectively. If all three *Uyir thatthukkal* are in the above said ratio the body will be healthy.

In Siddha system of medicine, the diseases were treated in many ways like *Mani, Manthiram, Avizhtham, Yogam* and *Varmam*. *Avizhtham* (Medicine) is one way to treat the diseases in Siddha medicine, which is further divided into 32 internal medicine and 32 external medicines. *Attaividal* (leech therapy) is a type of external therapy which is used as one form of bloodletting technique to treat various ailments.

In Siddha system of medicine, the leech therapy was described by various *Siddhars* in their literature, Particularly the *Siddhar Agastiyar* who explained leech therapy elaborately in his text *Agasthiyar ranavaithiyam* and *Agasthiyar nayanavithi*. In Siddha system of medicine, the leech therapy is one of the external therapies which are used as one of the bloodletting techniques to balance the vitiated humours particularly *Pitham* humour [1,2,3].

In Ayurveda, the leech therapy is classified as bloodletting and was found in the text of *Sushrutha*

samhita (dating 800 BC), *Dhanvantari*, the Indian god of Medicine holds a leech in one of his 4 hands. In Unani the leeches were used for bloodletting as far back as 3500 years ago in ancient Egypt. Venesection was central to Arabic surgery, which is mentioned in classical Unani literature *Alqanoonfilitib* and *Altasree fliman Ajeza Anittalif*.^[4] In ancient Greek history (5th century BC) bloodletting by leech was used to balance the humours. The recorded use of leech in medicine was also found during 200BC by Greek physician Nicander in colophon.^[5]

Therapeutic application of leech is one of the oldest treatments used for various ailments having been practiced among the various ancient people, including the Egyptians, the Mesopotamians, the Greeks, and the Aztecs. Hippocrates, a famous physician was first introduced Leech therapy in Greece. He is also known as father of medicine. The Roman philosopher Galen classified the Leech therapy as a method of treatment and prevention of health. He also believed that blood was the dominant humour and the one in most need of control. In order to maintain the balance of humours, physician would remove excess blood from the body. When Islamic theories became known in the Latin speaking countries of Europe, Leech therapy became more widespread.^[5]

Towards the end of the 19th century the use of leeches began to become widespread, in modern medicine (1970) the leech therapy was used in the micro surgery. In Modern medicine, the leech therapy was initiated by the surgeons, M Derganc and F Zdravic, who revealed the use of leeches in tissue flap surgery. Use of leech therapy in this way provides a good example for its current importance. It is often possible to reconnect the larger arterial blood vessels in reattached surgery of traumatic amputation, but not the thinner more delicate venous vessels. The body will ultimately develop the necessary venous connections to drain the area of deoxygenated blood, but if this does not occur rapidly sufficient, pooling of venous blood can produce enough swelling and pressure. In this condition the arterial blood does not enter freely to reconnected limb. In this position, leeches are used to drain the local blood and decompress the pressure within affected limb and reduce the risk of develops necrosis as a complication.

Medicinal leech therapy is also called as *Hirudo* therapy on the basis of commonly used leech species, *Hirudo medicinalis*.^[6] Today medicinal leeches are used in the treatment of various diseases such as cancer, varicose ulcer, varicose vein, deep vein thrombosis, rheumatoid arthritis, skin and

musculoskeletal diseases. In 2004, the food and drug association (FDA) approved the leech therapy.

Description of Leeches

Leech taxonomy

Leeches are related to the phylum annelid, class clitellata, it is classified in to 4 sub classes, 3 orders, 10 families, 16 subfamilies, 131 genera and 696 species. Leeches are hermaphrodite in nature and are distributed all over the world. In India, about 45 species belonging to 22 genera occur. The common Indian species are *Hirudinaria granulosa*, *H. viridis*, *H. javanica*, *H. ventralis* and *H. manillensis*. *Hirudo medicinalis* (Medicinal leech) is a European species which has been found in ponds and stream of the eastern portion of the United States. It is comparatively large in size and often growing up to 10 or more centimeters in length.^[5]

Leech locality and ecology

The leeches are lived in different environment, including aquatic and moist area. Some leeches are live in fresh water, river, ponds, lake and sea. The leeches have high physiological flexibility, which make them able to withstand numerous environmental changes.

According to Siddha system of medicine the medicinal leeches are live in pure water which contain *Salli* (*Nymphaea stellata*), *Neithal* (*Nymphaea pubescens*) and *Kotti* (*Aponogeton monostachyon*) plants. Small size leeches are only used for treatment purpose.^[5]

Medicinal leech

There are about 600-650 species were found around the world, out of this only 15-20 are used for treatment purpose. *Hirudo medicinalis* is the commonly used leeches for treatment purpose in western countries. In India, the leech *Hirudo ventralis* (Indian cattle leech) is used for medicinal purpose. Poisonous leeches are found in muddy water, gutters, or in water which is contaminated by urine.^[5]

Type of leeches

The leeches are classified in to non-poisonous and poisonous. The poisonous leeches are lives along within frog and other water animals. They are comparatively bigger in size and darker in colour. After the application they produces severe pain, itching or allergic reaction

In Siddha system of medicine, the leeches are classified into three types (non- poisonous leech, poisonous leech and normal leech). Non-poisonous leeches are further classified into four class (class I- white with light golden colour, class II- colour like of *Senkaluneer*, class III- coral like colour and rice sized, class IV- green or lemon colour). Poisonous leeches are Black, blackish-red, and rainbow like

multicoloured. Normal leeches are golden-colour with black. [1, 2]

Morphology of leech

The leeches are segmented worm. Fully matured adults can be up to 20cm in length. Its colour is green, brown or greenish brown with darker tone on the dorsal side and lighter on ventral side. It has two suckers, one at each end called anterior and posterior sucker. The anterior sucker is used for feeding. [7]

Maintenance and storage of leech

The leeches are stored in well labelled container having multiple pores on the top for proper aeration. The temperature should be maintained around 5-27°C, the water of the container should be pure and de-chlorinated and should be replaced once in 3 days. The place should be darker and ventilated

Benefits of leech therapy

According to Siddha system of medicine Leech sucks impure blood from our body, so it is used to detoxify the blood and neutralise the vitiated *Thrithodam*. [1]

Leech therapy procedure

The leech therapy procedure was elaborately described in Siddha classical text *Agasthiyar nayanavidhi* which deals the collection of leeches, storage of leech, preparation of patient, purification of leech, main procedure and post treat procedure [1,2].

Pre-leech application procedure

Purification of leech

The leeches are allowed into turmeric water for 5-10 minutes and then put into normal water.

Preparation of site used for leech application

The site is cleaned by pure water and then allowed to dry.

Preparation of patient

The patients are advice to take purgation previous day of leech therapy. The patients are also advised to take light food prior to procedure.

Main procedure

The leeches are applied in desirable site with gentle handling. The mouth will become round like suction cup when attached, the neck slightly arched. It will start to swell and can't move and then the leeches are covered with wet cloth during sucking period. The leech will swell up to 5 times of their size. After sucking the blood, the leeches fell down spontaneously within 30 to 70 minutes or it can be removed by applying turmeric powder on its mouth. Patient may lose up to 15 cc blood per leech, but wound may continue to ooze blood up to 50-150ml [1,2].

Post leech application procedure

Purification of leech

After sucking, the leeches are inducted to vomit the blood, for that the turmeric powder is dusted on in its mouth or pressing the leech from caudal to front end, after that the leeches are allowed to swim in turmeric water followed by pure water, and then the leeches are stored in separate labelled container.

Dressing of leech site

The sites are cleaned and dressed with pulp of *Aloe vera* dusted with turmeric powder.

Important point in leech therapy

One session of leech therapy requires about 1-2 hrs and about 1-6 leeches are required depending upon the clinical condition [1,2]. It leaves Y-shaped bite mark and it disappears within 2-3 weeks. Symptoms of excessive blood loss are red skin, itching, pain and fever. The leeches should be suck only impure blood, when leeches start to suck pure blood produces the symptom of pricking pain and itching at the site of the bite. [8]

Selection of leeches for leech therapy

Non-poisonous are only used. Too small or too long leeches are not to be preferred, only medium sized leeches are used. [1, 2]

Frequency of leech therapy

It varies according to the severity of diseases; generally, it should be applied once in a week. [1, 2]

Precaution during leech therapy

The patients with bleeding disorders like haemophilia, highly infective patients like HIV patients and hepatitis B patients are not advised for leech therapy. The leeches used for one person are not used for another person to avoid cross infection. The therapy should be done with proper disinfecting condition. Complication of infection were occurs only in 2-36% of patients. There are no reports of leech transmitted diseases in leech application.

Complication of leech therapy

The most important complication is the risk of leech borne infection caused by bacterias *aeromonas hydrophilia* present in the leech gut, which may cause pneumonia, septicaemia or gastroenteritis [9]. Allergic reaction may occur in leech site. Ulcerative necrosis may occur due to toxins present in leech saliva. Prolonged bleeding and rarely ulcer formation may occur at the site of bite. Excessive bleeding that may require a blood transfusion is another complication in leech therapy [10].

Disposal of leech

The used leech should be destroyed with 70% of alcohol and disposed like that of biomedical waste.

Mechanism of action

In Siddha system of medicine the leech therapy was used as one of the bloodletting technique to remove the toxic blood from the body. According to Siddha concept, the leech application works on the basis of normalisation of *Uyirthatukal* by removing toxic blood from the body and cure the diseases. Leech therapy was used for various diseases especially for *Pitham* vitiated diseases, because the leech has *Thatpa Gunam* (Cold potency).

The apparent benefits of leech therapy are that they help relieve venous congestion by removing excessive collective blood physically from congested tissue.^[11] From modern concept, as proved by various research studies, the efficacy of leech therapy is not only in the amount of blood that the leech ingested, but it is also by leech saliva which contains more than 100 biological active compounds which cause effect of leech therapy. The salivary glands secretion has analgesic, anti-inflammatory, bacteriostatic activity. It also have resolving activity, eliminate the microcirculation disorders, restore the vascular permeability of tissue and origins, reduce the blood pressure, eliminate the hypoxia, increase the immune system activity, detoxifies the organism by antioxidant pathway, and improve the bioenergetics status of organism. This active compound includes anticoagulant Hirudin, Calin, inhibitor of kallikrein, hyaluronidase, histamine like vasodilators, collagenase, analgesic, anti-inflammatory substance, destabilase, hirustasin, tryptase inhibitor, Eglin, acetylcholine, carboxypeptidase A inhibitors, immune-modulator effect, etc.^[12]

Hirudin is responsible for anticoagulant of blood and it is used as anticoagulant in surgical procedure. Calin is also anticoagulant substance but it is responsible for secondary bleeding for approximately 12 hours in leech bite site. Hyaluronidase is facilitating the penetration and dilution of pharmacologically active substances into tissue, particularly in joint pain and also has antibiotic activity. Destabilase is dissolves fibrin and has thrombolytic effect. Hirustasin inhibit strypsin, kallikrein, chymotrypsin and neutropholic cathepsin. G.Bdellins has anti-inflammatory effect and inhibits trypsin, plasmin and acrocin. Chloromycetin is potent antibiotic. Eglin is anti-inflammatory and inhibits the activity of alpha-chymotrypsin, chymase, subtilisin, elastase and cathepsin. Factor X an inhibitor inhibits the activity of coagulation factor X. Aesthetic-like substance reduces pain during biting by a leech. Acetylcholine is vasodilator. Collagenase reduces

collagen and carboxypeptidase A inhibitors increases the inflow of blood^[13]. Histamine like substances cause dilatation of blood vessels and produce bleeding. Some of the substances were also have anti-inflammatory effect. On the basis of lipotropic activity it can be used for ischemic heart disease. The biological active compound present in leech saliva act on target organ through vein during sucking of leech and increase the blood circulation in the organ.

Indication for leech therapy in Siddha system of medicine

Traumatic oedema, tumour, abscess, sprain, uncontrolled vomiting, headache, abdominal and chest diseases, hepatomegaly, abdominal cramps caused by dysentery, whooping cough, eye diseases and joint swelling^[1,2,14]

Indication of leech therapy in Ayurveda

Abscess, lump, piles, skin diseases, sclerosis, throat diseases, eye diseases, cyst, tumour, filariasis, poisoning, pemphigus, headache, dental disorder, etc.^[15]

Indication for leech therapy in Modern medicine

In modern medicine, the leech therapy has been used and studied in cardiovascular diseases, cancer, diabetes, infection, arthritis, dental concerns^[16], haemorrhoids, hearing loss, tinnitus, pain relief, post-plastic surgery, replantation and other reconstructive surgeries.^[17] Hirudo therapy is a safe, easy to use, beneficial and cost-effective treatment to save reattached body parts and flaps in reconstructive plastic surgery.^[18]

Indication for leech therapy in Unani medicine

The commonest indication of leech therapy in Unani medicine as mentioned in classic Unani text are varicose vein, blepharitis, painful calf muscles, mania, septic wounds, non-healing ulcer, lymphadenitis, inflamed organ, sinusitis, pharyngitis, piles, fistula in ano, elephantiasis, at the bite of poisonous animals, skin disorders, warts, chloasma, eczema, psoriasis, osteoarthritis, hypertension and vitiligo, etc^[4].

Other indications

Arthrosis, peri arthritis, rheumatoid arthritis, thrombophlebitis, thrombosis, embolism, external ear and chronic ear diseases, eye diseases; including cataracts, glaucoma, traumatic injury and inflammation, dental diseases; like gingivitis, paradonitis and stomatorrhagia, GI tract; hepatitis, cholecystitis, pancreatitis, stomach ulcer, respiratory disorders; asthma, acute rhino pharyngitis, and coryza, gynaecological disorders, male and female sterility, endometriosis, and mastitis.

Contraindication of leech therapy

The leech therapy is contraindicated in Anaemia, pregnancy, allergic patients, in extreme cold and hot climate, bleeding disorders like haemophilia, children and old age people.^[1]

Sites which are not suitable for leech application mentioned in Siddha literature are testis, penis, breast, eyelid & other fleshy parts, pulsate part (*Naadi Parkum Idangal*).^[1]

Scientific papers on leech therapy

Presently various clinical and experimental studies have been conducted internationally to evaluate the efficacy of leech therapy in various diseases condition. The leech application has proved very valuable in microsurgeries and in various type of arthritis. Leech therapy reduces joint dysfunction, pain and stiffness in people with osteoarthritis of knee joint^[7] as reported by new study in the annals of internal medicine^[4]. A study from Kashmir valley has established the safety and efficacy of leech therapy in the management of frostbite^[4]. Another study from India proved the anti-inflammatory effect of leech therapy in psoriasis patient^[19]. Similarly, one more study from India has proved the leech therapy gives the significant relief for symptoms of eczema^[20]. The leech therapy improved incisional skin wound healing in rats^[21]. Recently, research is being conducted in various aspects to determine the effect of leech therapy in various ailments like gout^[22], vitiligo^[23], varicose vein^[24], varicose ulcer, lupus erythematosus, thrombosed piles^[25], burger's diseases^[26], epidermoid cyst^[27], arthrosis of the first carpo metacarpal Joint^[28] and many more.

CONCLUSION

This is concluded that the leech therapy was used in Siddha and other system of medicine for various medical and surgical conditions. The leech saliva contains more biologically active compounds, on this basis it was used in the field of plastic and reconstructive surgery. The Scientific studies on leech saliva were proven and support the leech application in Siddha system of medicine.

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