



## LEECH THERAPY (*HIRUDOTHERAPY- OR IRSAL-E-ALAQ*) IN UNANI SYSTEM OF MEDICINE AND MODERN MEDICINE – A REVIEW ARTICLE

Dr. Amjad Kha Saleem Kha Pathan\*<sup>1</sup>, Dr. Salim Yunus Khan<sup>2</sup>, Dr. Shadab Jamal Anwar Iqbal Ahmad Makhdoomi<sup>3</sup>, Dr. Sharique Zohaib<sup>4</sup> and Dr. Sameeroddin Gayasoddin Shaikh<sup>5</sup>

<sup>1</sup>Assistant Professor, Dept. Ilaj-Bit-Tadbeer. Yunus Fazlani Unani Medical College, Kunjkhedra, Kannad.

<sup>2</sup>Associate Professor, Dept. of Kulliyat, Ahmad Garib Unani Medical College, Akkalkuwa.

<sup>3</sup>Assistant Professor, Department of Amraz e Atfal (Pediatrics), Dr. M.I.J.T. Unani Medical College and H.A.R. Kalsekar Tibbia Hospital. Mumbai.

<sup>4</sup>Associate Professor, Dept. of Saidla, Mohammadia Tibbia College, Mansoor, Malegaon.

<sup>5</sup>Associate Professor, Dept. Tahaffuzi wa Samaji Tib, Ahmad Garib Unani Medical College, Akkalkuwa.



\*Corresponding Author: Dr. Amjad Kha Saleem Kha Pathan

Assistant Professor, Dept. Ilaj-Bit-Tadbeer. Yunus Fazlani Unani Medical College, Kunjkhedra, Kannad.

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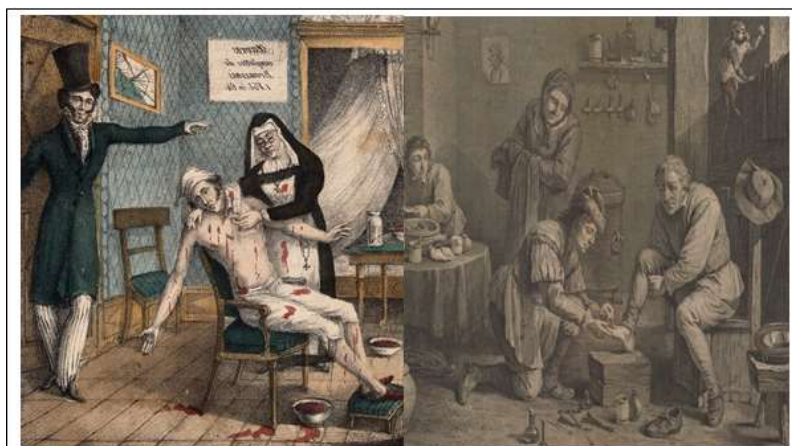
### ABSTRACT

Hirudotherapy which means the use of leech therapy dates as far back as 2500 years ago when they were used for bloodletting in ancient Egypt. During the Roman Era, Galen (130- 201 AD) used leeches because he believed that blood let- ting would rid the unbalance of the four humours (blood, phlegmon, black and yellow bile) in the human body. Leech treatments were very popular during the Middle Ages as applied by Ibn-Sina (Avicenna). In his book” Al-Qanun Fi Al-Tibb (the Canon of Medicine)”, Avicenna (980-1037 AD) gave detailed knowledge about leech therapy and instructions on leeching. Irsale Alaq (Leech or Hirudo therapy) is one of the most important and widely practised methods of regimental therapy used for local evacuation of morbid humours. It is a procedure of treatment with the use of medicinal leeches. It has been suggested and successfully practised by Greeco-Arab physicians in the management of musculoskeletal diseases, gynaecological disorders, chronic skin diseases, thromboembolic diseases, varicose veins, ENT disorders etc. since long. The leech produces a number of substances especially hirudin, calin, hylarunidase, histamine like vasodilators during biting. These substances are responsible for inhibiting blood coagulation, analgesic effect, dilating effect on muscles and regulation on immune system. The aim of this study was to explore the history and therapeutic applications of leech therapy from ancient times to present.

**KEYWORDS:** Leech therapy, Hirudotherapy, bloodletting, Application of Leech, Indications.

### INTRODUCTION LEECH THERAPY, HISTORY & BACKGROUND

Blood-letting was one of the oldest and common therapeutic methods in Mesopotamian, Egyptian, Greek, Greco-Roman and Byzantine medicine. The methods used for this purpose were cupping, venesection and application of leeches. Each method was used in different conditions, depending on the sufficient amount of blood to be removed and the certain important organs affected.<sup>[1]</sup> Leech therapy has used for the treatment of a lot of diseases since ancient times. Leech is derived from the Anglo-Saxon word “laece” which, means “physician”.<sup>[2,3]</sup> Hirudotherapy” which is called leech therapy in Latin, is a means of treatment used by physicians for ages.



**Fig. 1: Leech Therapy in Ancient Greek & Rome (200-130 B.C.).**

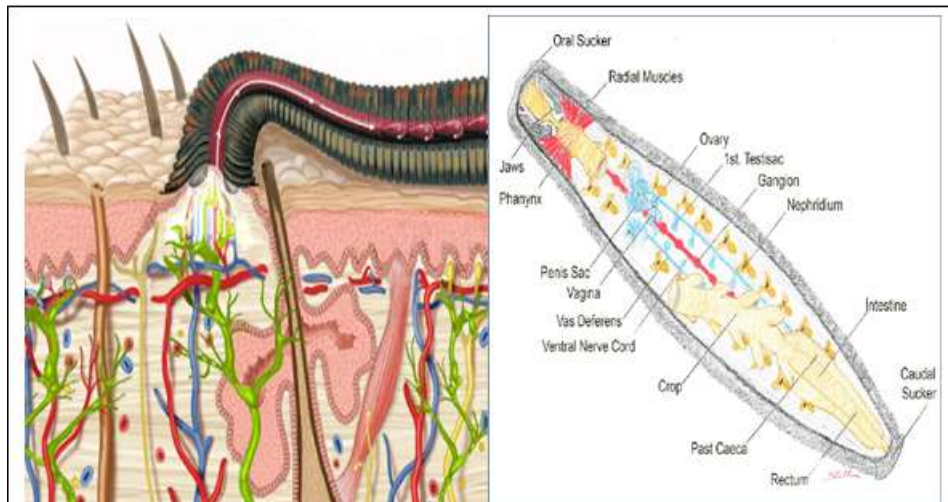
The first use of leeches for medical purposes can be seen in the wall paintings of an Egyptian tomb (1567- 1308 BC). The first written record of their medicinal use has been attributed to Nicander of Colophon (200- 130 BC) in his medical poem ‘Alexipharmaca’.<sup>[2]</sup> The therapeutic use of leeches has also been reported by Themison of Laodicea, a pupil of Asclepiades in the year 50 BC.<sup>[4]</sup> The physician Pliny (23-79 AD) states that it provides relief for the person by removal of the excessive blood from the human body, and also indicates the methods of leech application.<sup>[5,6]</sup> Galen, during the Roman period (130- 201 AD), indicated the use of leeches, its application methods, the removal of the leech from the body, the treatment of any bleed- ing that might occur on the wound after leech sucked the blood. According to the humoral theory that Galen developed, the human body contains four fluids: blood, phlegm, yellow bile and black bile. He indicated that changes in the balance of these fluids cause diseases and leeches suck the excessive blood and provide the regeneration of the balance.<sup>[7]</sup> In the same century, another physician Menemachus used leech therapy. Oribasius, a physician in the 4th century, applied the leech therapy. Oribasius, Paul of Aegina and Aetius of Amida reported in their works that Antylus, the surgeon, also applied the leech therapy.<sup>[1,8]</sup> Alexander of Tralles (525-605 AD) suggested application of leeches in some hearing loss and the treatment of ‘‘melancholia’’. In antiquity, they recommended this therapy as they believed mel- ancholia develops as a result of accumulation of black bile in the brain or the whole blood of flow.<sup>[1]</sup> In the 6th century AD Aetius of Amida mentioned the leech ap- plication for the eye disease, which he called ‘‘onchia’’, creating a circle around the iris of the eye due to ulcer development in the deep layers of the eye. Aetius also recommended the use of leeches for the disorder, called ‘‘catharsis’’ that is caused by imbalance of body fluids, especially imbalance of blood.<sup>[9]</sup> Paul of Aegina, in the 7th century, mentioned the application of leech in the treatment of many diseases. He benefited from the application of leeches especially for headaches that he called ‘‘cephalea’’ and eye disorders, known as ‘‘amourosis’’ and ‘‘ophthalmy’’, and also inflammatory disease of the throat.<sup>[10]</sup> Ibn Sina (980-1037 AD) is a pioneer physician in Islamic Medicine and

his famous book ‘‘Canon’’ was translated into Ottoman Turkish by Tokatlı Mustafa Efendi in 18th century. The manuscripts of this translation are to be found in the copy form in places as follows: Topkapı Palace (IIIth Ahmet 1903); the Library of Süleymaniye, (Hamidiye 1015) and the Library of Ragıp Pasa (1335).<sup>[11]</sup> One of the things he mentioned in this book is the diseases for which leech therapy is applied along with its methods of application. According to Ibn Sina (Avicenna) the application of leech is more useful than cupping in letting odd the blood from deeper parts of the body.<sup>[11,12]</sup> Ebul Kasım Zehravi (936-1013 AD) explained in his book, ‘‘Kitab-ul Tasrif’’, that cupping, bloodletting and leeching could be used for medicinal purpose. Leeches can be applied to the specific areas such as eye, lip, nose and gums where cupping can not be employed.<sup>[13]</sup> As removal of the excessive blood was a commonly used method during the 17th and 18th centuries, leech therapy was also widely used. It was used for medicinal blood- letting and believed to cure a variety of diseases from gout to headaches.<sup>[14]</sup> Surgeon Broussais (1772-1838) in Napoleon’s army units recommended removal of blood from the body or leech thera- py since he believed that any blood accumulation in the body causes inflammation and inflammation causes dis- eases.<sup>[15,16]</sup> French physicians even prescribed leech therapy for the patients admitted to hospitals without the need for examination. Leech therapy was applied without considering the diagnosis of the disease and the starting age of this treatment, side effects of it and the patient’s health status. During the same period, as it was considered to be a popular method of treatment in European countries, in Britain and Russia, it was used for treatment of inflammatory diseases of brain tissue, liver and kidney diseases, certain ophthalmologic dis- eases, nose bleeding, rheumatism, tuberculosis, epilepsy and sexually transmitted diseases.<sup>[17]</sup> Leech short- ages were reported in Europe during that time.<sup>[14]</sup> It is known that leech therapy was used by physicians in the Ottoman period and a great many written works are available especially in the 18th century.<sup>[18]</sup> Serefeddin Sabuncuoglu was a famous Ottoman surgeon and physician. He was the author of Cerrahiyetu’l - Haniyye (Imperial Surgery), the first illustrated Turkish-written surgical atlas. The

leech therapy was described in his book.<sup>[19]</sup> Sanizade Mehmet Ataullah Efendi (1771- 1826), in his work "Mi'yarul Etibba", recommended leech therapy to the back of ear for fever treatment, which developed in children during tooth growth.<sup>[20]</sup> At the end of the 19th century, with the trend of experimental methods, practicing this method was outdated and it was regarded as quackery because unqualified persons had also applied it.<sup>[21]</sup>

In 1884, Doctor John B. Haycraft called the pure

anticoagulant substance, which he found in the saliva of leeches, "Hirudin" in Latin "Hirudo"<sup>[22]</sup> Since the second half of the 20th century, physicians especially micro surgeons have supported the use of leech again. On studies, based on observation, with the use of leech in the early period, it has been observed that there has been a noticeable improvement on the tissues which venous congestion has developed. Peer-reviewed evidence has proposed that venous congested flap is improved by early application of a leech.<sup>[22,23]</sup>



**Fig. 2: Anatomy of Leech and Sucking Process.**

### I. Leeches

**Leeches** are segmented parasitic or predatory worms that comprise the subclass **Hirudinea** within the phylum Annelida. They are closely related to the oligochaetes, which include the earthworm, and like them have soft, muscular segmented bodies that can lengthen and contract. Both groups are hermaphrodites and have a clitellum, but leeches typically differ from the oligochaetes in having suckers at both ends and in having ring markings that do not correspond with their internal segmentation. The body is muscular and relatively solid, and the coelom, the spacious body cavity found in other annelids, is reduced to small channels. The majority of leeches live in freshwater habitats, while some species can be found in terrestrial or marine environments. The best-known species, such as the medicinal leech, *Hirudo medicinalis*, are hematophagous, attaching themselves to a host with a sucker and feeding on blood, having first secreted the peptide hirudin to prevent the blood from clotting. The jaws used to pierce the skin are replaced in other species by a proboscis which is pushed into the skin. A minority of leech species are predatory, mostly preying on small invertebrates.

### II. Modern and contemporary age of Leech Therapy

In Europe, during the 17th and 18th centuries, bloodletting and especially leeching became very popular and widespread practices, becoming an essential part of the armamentarium of physicians and barbers. Leeches were kept in dedicated jars filled with water

with the lids pierced to allow the annelids to breathe. Originally, the vessels were of glass, later of precious ceramic and finely decorated. Ornate leech vessels adorned the windows and counters of nearly all pharmacies. For home visits, doctors used small glass or pewter containers that could hold about a dozen leeches. Leeching peaked in the early 1800 s, becoming one of the most important items in international trade. The Frenchman François Joseph Victor Broussais (1772 – 1838) one of Napoleon's physicians, later professor of general pathology — was the most ardent supporter of leeching, so much so that he was called the “vampire of medicine”. Broussais's medical theory was based on the belief that almost all diseases were nothing more than manifestations of different degrees of organ "irritation". This irritation resulted in inflammation whose primary site in most cases was in the gastrointestinal tract. Through “sympathy” — a term that includes both vascular and neural connections — gastrointestinal inflammation could cause irritation in other organ systems, which in turn could, again by “sympathy”, induce dysfunction in yet other systems. Therefore, the etiology of almost all diseases was traceable to “gastroenteritis”, whether they were tuberculosis, syphilis, febrile diseases, cancer or other. The best treatment used to cure them consisted of a starvation diet and the application of so many leeches on the patient's abdomen that it looked like a “black glittering coat of mail”.





**Fig. 3** Elegant English ceramic display jar from the mid-1800. & François Joseph Victor Broussais (1772 – 1838) Lithograph by N. E. Maurin Between 1829 and 1836 it was estimated that 5–6 million medicinal leeches were used in Parisian hospitals.

And that these removed about 84,000 kg of blood annually. Leeching was used for nearly all diseases: from typhoid fever to tuberculosis, from syphilis to smallpox, from worms to obesity and mental illnesses, and even in mild cases of appendicitis. William Stokes (1804 – 1878) prescribed 20–40 leeches for gastritis therapy; Gustave Behrend (1847 – 1925) described the significant efficacy of applying 6–10 leeches in scarlet fever. No contraindications to MLT were reported, therefore patients of any age and regardless of health condition were eligible for treatment. Famous people also used leech therapy, including Napoleon to treat his hemorrhoids, while the Russian writer Gogol was subjected to leeching in his nostrils. Leeching even influenced the culture and fashion of the time, inspiring poems and embroidery of colorful leeches on elegant dresses of classy women in the renowned Parisian salons. MLT during the 19th century became so widespread that the species was in danger of extinction in Europe. According to French import records, hospitals used an astonishing numbers of leeches, importing around a billion into France; Britain alone imported 4 million leeches annually, while Russia consumed approximately 30 million per year. Although various species of leeches were used in Europe, *H. medicinalis* was the most widespread and appreciated medicinal leech. Millions of these specimens were also imported into the United States from Europe, as they were considered more effective than the native North American hematophagous leech *Macrobdeella decora*. The imports were essentially from Germany, so much so that the German authorities feared that the remaining stocks were not enough for their country's needs. Due to the difficulty of sourcing European medicinal leeches, the Americans instituted a \$ 500 prize for anyone willing to breed European leeches in the United States. By the early 20th century, thanks to the spread of the scientific-experimental method in medicine and new scientific achievements in the microbiological and pathophysiological field, leeching lost its popularity. The statistical studies of the French

clinician Pierre-Charles-Alexandre Louis (1787 – 1872) also contributed to this, showing that bloodletting was useless if not harmful in many diseases.<sup>[28]</sup> Thus, in the first decades of the twentieth century there are only occasional references in the literature to its use in some pathological conditions. Interestingly, in the last three decades MLT has received renewed interest in both scientific research and therapeutic application. This approach has mainly been used in plastic and reconstructive microsurgery, to aid salvage of compromised microvascular free-tissue transfers, replanted digits, auricles, lips, scalps, nasal tips, and to treat complex facial lacerations. More recently, MLT has also been tested for various other diseases including migraine, vascular diseases, osteoarthritis, skin disorders, macroglossia, pain management, diabetic foot ulcers, priapism and cancer. Further therapeutic potential of leeching is currently under investigation.

### III. Features of the Leeches

Leeches are in class of Hirudinea of Annelida of helminths. There are more than 650 known species. One of the most popular medicinal leeches, *Hirudo medicinalis*, may be living in fresh waters and its length is nearly 10 cm. When the anatomies of leeches are examined, it can be seen that their body is composed of fixed number, 34 segments and their body shapes are in dorsa-ventral flat. *Hirudo medicinalis* has two suckers: one present anteriorly on the head, and the other on the posterior end. The mouth lies in the anterior sucker and has three jaws with the teeth well designed for biting. The leech can ingest blood almost ten times its own weight.<sup>[17,25]</sup> Substance of leech saliva is composed of therapeutic secretions. Leeches secrete bioactive substances to the body while sucking the blood. One of these substances is Hirudin, a polypeptide molecular, with 9000 molecules weight, is composed of 65 amino acids. Hirudin, with the anticoagulant property, can be used as “Heparin”. It forms an enzyme inhibitory complex with thrombin, thus preventing conversion of fibrinogen to fibrin.<sup>[12]</sup>



**Fig. 4: Application of Leech Therapy in Various Diseases.**

#### IV. Application of Leech Therapy

Application area should be thoroughly cleaned with water so that leech can stick to. Sugared water or milk can be poured to the desired region or, a small scratch can be formed with the tip of the injector or lancets. With the help of forceps, leech can be taken out of the jar and laid upon the desired location. Leech is usually saturated in 15 to 20 minutes. Despite a long period of time, when attached leeches do not leave, pulling them away can be extremely dangerous. The teeth of leech can stay in the place of its bite and can cause infection. With the help of cotton or cloth that is soaked in alcohol or saline, leech can be removed from host. By application of watery mug, the toxins can be removed.<sup>[12]</sup> Saturated leech can be killed by putting it in 70% alcohol solution. Leeches used for one patient shouldn't be reapplied for another patient.<sup>[27]</sup>

#### V. Complications of Leech Therapy

The most common complication after leech therapy is prolongation of bleeding time. In this case, topical thrombin and pressure is applied for the treatment. In addition, allergic reactions to leech saliva and some bacterial infections may also occur.<sup>[2]</sup> Allergic reactions, starting as simple itching can also be seen in the form of burning sensations and even worse, lead to the cause of ulcerative necrosis. These complications are the result of toxins found in the leech saliva.<sup>[3,4]</sup> Infection may develop due to the re-use of leeches and scar tissue may exist due to the excessive use in the field of the treatment.<sup>[2,9]</sup>

#### VI. Indication of Leech Therapy

The famous Unani physicians described various therapeutic uses of leeches in numerous disorders ranging from Dermatology, Ophthalmology, Gynaecology, Synosteology, International Journal of Unani and Integrative Medicine Phlebology, pains, fissures, certain infections and Neurological disorders. They even locally applied dried powder of leeches in sore throat, haemorrhoids, urethritis. Rufus (1st century) has recommended application of leeches in *Qurooh-e-kohna mota'affina* (chronic infected ulcers) and *Khanazeer -e mutaqarraha* (ulcerative cervical lymphadenopathy) at the periphery of the lesion but on the affected site in case of *Sartan* (carcinoma) Besides, he also suggested leeching around the nose in nasal diseases and at the medial canthus of eye in diseases of eye.



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Fig. 5: Indications of Leech Therapy in various skin infections.

Razi (850-923) A.D) has recommended the use of leeches in *Quba* (fungal dermatosis), *sa 'afa* (Alopecia), *Qurooh-e balkhiya* (Chronic ulcers), *Waja-ul-mafasil* (Arthritis), chronic headache, paralysis, tonsillitis, sore throat, low bachache, sciatica and scar. Ibn Sina wrote that leeching is beneficial in skin diseases like cicatricial alopecia, dermatophytes, chloasma, angioma. Ibn Al-quf-Almasihi advocated leeching in carbuncle, elephantiasis, alopecia and varicose vein. Al-baghdadi mentioned the efficacy of leeching in venous congestion after surgical procedures. Imamuddin prescribed leeching in early cataract, trichiasis, iris prolapse, blephritis, subconjunctival bleeding, pterygium, sore throat toothache, uvulitis, stomatitis and glossitis. Hakeem Azam Khan advocated in elephantiasis, penile

inflammation, pruritus ani and fissure in ano. According to Razi, application of leeches on the post-auricular region is beneficial in migraine. Application of leeches on the hip joint has been described by Razi for relieving sciatic pain. Similarly, Razi advised the application of leeches on the affected area in a patient of backache. Tabri advised that in psychosis caused due to combustion of sanguineous humours, leech application on the scalp is beneficial. Ibn-hobal-al-baghdadi (1121-1213 A.D) suggested the use of leeches after the evacuation of deranged humors through *Fasd* (Venesection) and *Ishal* (Purgation). He also mentioned that leech removed bad blood from the site of fungal dermatosis, alopecia, chronic wounds and also relieves nasal pain.



Fig. 6 Effects of Leech therapy before during and after infection.



Overall Unani scholars have recommended *Taleeq* (Leeching) for the skin diseases like *quba* (Fungal infections), *Da-ul-feel* (Filarississ), *Nar-e-farsi* (Eczema), *Sa'afa* (Alopecia), *Daus'salab* (Tinea Capitis), *Qurooh-e-muzmina ghair mundamila* (Chronic Non-heading ulcers), diseases of the eyes and nose, *khanazeer* (cervical lymphadenopathy), *waja-ul-mafasil* (arthritis), *irqun-nisa* (Sciatica), *dawali* (varicose vein) *Zatul-janb* (pleurisy), *Zatur-riya* (pneumonia), *Sozish-e-ghesha-ul-qalb* (pericardial pain), *Sozish-e-azlat-e-qalb* (myocardial pain), *Sozish-e-jigar* (hepatic pain), *Sozish-e-dimagh* (meningeal pain), *Sozish-e-khusiya-tur-raham* (ovarian pain), *sozish-e-Raham* (uterine pain), *sozish-e-lauzatain* (tonsillar pain), *Sozish-e-Halaq* (throat pain), *waja-ul-uzn* (earache) etc. to relieve these agonies.

Abdul Qasim Zahrawi (936-1036A.D) has suggested that leeching should be done at such sites where cupping cannot be performed like on lips and gums. They can also be applied over the parts having least flesh like finger and nose. He further suggested that sucking the part through cups or washing it with vinegar and plenty of water has additional benefits of this procedure. Akbar Arzani (16th century), an Indian physician, states that leeching is a substitute for venesection in case of children. He mentioned its main benefit in chronic dermatological disease like alopecia and infections.

For the treatment of sanguineous diphtheria, Azam Khan advised that if the patient is not weak or malnourished, then application of leeches on the neck and below both the ears is beneficial. If the patient had difficulty in swallowing, then he advised the application of leeches on the nape of the neck in young age patients.<sup>[48]</sup> The blood-sucking activity of leeches was also employed for relieving piles by Azam Khan. The best results, according to him, are obtained by applying leeches on the lowest part of the sacrum, or they may be applied around the swellings or even on the pile mass. It was also used in the treatment of anal fissure. Application of leeches on the affected area was also thought to be beneficial in orchitis. Leech therapy was even employed in certain paediatric diseases. According to Azam Khan, if an abscess is caused on the umbilicus, then application of leeches around the lesion may be done if the child is more than two months old. For drainage of stagnant secretions in *filariasis*, leech therapy may be done on the heels after the patient had undergone *istifragh* (evacuation of morbid humours) with medicines.<sup>[49]</sup> It is also mentioned in *Jarahate Zohrawia* that more often leeching can be done in that areas of the body where venesection and wet cupping is not possible. And because of its small size it can also be used in lips and gums and in those organs which are devoid of muscles e.g. finger and nose. According to a study conducted at RRIUM, Srinagar, India, leech therapy has a definite prophylactic and curative role in the treatment of frost bite.

## VII. Characteristics of Medicinal and Poisonous Leeches

### A. Medicinal Leech

In ponds and lakes various kind of leeches are found but they all are not useful for medicinal purpose. The leeches which are used for medicinal purpose are found in that water which consists of green algae and small frogs in it, only those leeches can be used for treatment purpose. *Ibn sina* states the following features of therapeutically usable leeches.<sup>[20]</sup>

- Emerald green leeches, which are predominantly, green and have yellow stripes.
- Brown leeches with round sides.
- Leeches that have colour like liver.
- Leeches, which look like little locusts, and those, which resemble mouse tails.
- Leeches that are thin and have tiny heads.

*Ibn-al-quf* has additionally suggested the use of such leeches, which are in resemblance with yellow coloured locusts, mash color leeches, blackish red leeches. He further clarified *Ibn sina's* statement that the leeches from the water containing frogs are to be used because frog cleanse and softens the water and remove the toxic impurities.<sup>[6]</sup>

### B. Poisonous Leech

We should avoid those leeches which have following characteristics.

- Those which have large heads.
- Those which have blackish grey and green color.
- Those which have hairs on their body.
- Those resembling eels (snake fish, Bam fish).
- Those upon which are azure lines and those that change their colours.
- Those which have red and green stomach especially when they are found in flowing water.

Use of these kinds of leeches can result in various kind of diseases like syncope, hemorrhage, inflammation.

## VIII. Leech physiology

When the leech is attached a host with the use of two suckers at an each end, it will ingest around 5 – 15ml of blood up to 10 times its body weight in approximately 10 – 60 minutes before detaching itself. The leech's gut harbors an International Journal of Advance Research in Nursing bacterium known as *Aeromonas hydrophila*. This bacterium aids in the digestion of ingested blood and produces an antibiotic that kills the other bacteria that may cause putrefaction. The medical term for such a cornucopia of effects is called a "multifactorial mechanism." The entire course of treatment may require one to 6 treatments or more, depending upon the goals and rate of response.

### Leach saliva contains a number of different substances as follows

- **Hirudin:** It has an anticoagulant effect. This component inhibits conversion of fibrinogen to fibrin which results inhibition of blood coagulation.
- **Vasodilator:** It has acetylcholine and histamine-like substances as well as carboxypeptidase A inhibitors. These can increase blood flow by dilating constricted vessels.
- **Anaesthetic compound:** allows for painless attachment
- **Calin:** Binds to collagen and produces a prolonged anticoagulant effect up to 10 hours.
- **Destabilase:** Dissolves fibrin and has thrombolytic effects.
- **Hirustasin:** Inhibits kallikrein, trypsin, chymotrypsin, and neutrophilic cathepsin G.
- **Bdellins:** Anti-inflammatory effect and inhibits trypsin, plasmin and acrocin.
- **Chloromycetin:** Potent antibiotic.
- **Tryptase inhibitor:** Inhibits proteolytic enzymes of host mast cells.
- **Eglins:** Anti-inflammatory. They inhibit the activity of alpha-chymotrypsin, chymase, subtilisin, elastase, and cathepsin G.
- **Carboxypeptidase- A inhibitors:** Increase the inflow of blood
- **Factor Xa Inhibitor:** This restrains the coagulating effect of the coagulation Factor Xa
- **Hyaluronidase:** Hyaluronidase enhances the viscosity of interstitial fluid.
- **Antibacterial Enzymes:** Boost the immune system and fight of further Infection.
- **Anti-inflammatory agents:** aid in reduction of inflammation thereby blood can pass freely into the vessels.

### IX. Procedure of Hirudotherapy

*Ibn Sina* narrated that leeches should be collected one day prior to their use. If possible, they should be held upside down till the content of their stomach comes out. A more modern use of leech therapy was introduced by Abdul-Latif al-Baghdadi in the 12th century, who wrote that over use of leech might be risky. He suggested that leech need to be cleaned before being used and that the dirt or dust clinging to a leech must be wiped off before application.<sup>[24]</sup> *Abu-Al-Qasim Zahrawi* emphasized that, should not use the same leech on other patients. *Al-Zahrawi* was aware of infectious complication of leech therapy.<sup>[25]</sup> Patient is advised to take light semi-solid diet prior to the leech therapy.

Unani literature describes that the part to be treated should be washed with a solution of borax and rubbed until red or potter's clay should be applied and if the leech is reluctant to bite a tiny droplet of blood may be smeared on part to be treated, drawn from the wound site with a needle prick and then applied the leech.<sup>[26]</sup> According to modern concept the site where leeches are

to be placed should be clean and free of ointments, pastes etc. Cleaning can be done by sterile ringer solution, physiological sodium chloride solution or International Journal of Unani and Integrative Medicine sterile water. One or more leeches are applied to the affected area and left usually for half to one hour. According to Mumcuoglu KY, one to 5 leeches are used for each session of treatment, depending on the clinical case and purpose of the treatment.<sup>[27]</sup> A patient can safely tolerate up-to 16 leeches in severe and resistant conditions. Once the leech is attached, it will likely remain safely in place until fully distended, but it is important that the site to be checked continuously to ensure that they has not moved. The leeches are allowed to remain till it removed spontaneously or can be removed by loosening their grip with sprinkling little salt, borax, ashes of burnt flax cloth, burnt sponge, burnt wool, or turmeric powder over it. *Ibn-Sina* acknowledged the particular vulnerability of children and recommended watching them overnight after leeching.<sup>[26]</sup> The used leeches are killed and disposed of.<sup>[28,29]</sup> After the detachment of leech, affected part is cleaned with antiseptic solution and bandaged. Patient should be observed for further bleeding, allergic reaction or for any kind of possible infection. If bleeding persisted, *Avicenna* employed a dusting of burnt galls, quicklime, ashes, cobwebs, ground earthenware, or alum. Failing these, he suggested cautery. He also believed that following leech therapy, the place should be sucked by cupping, in order to extract some of the blood and thereby get rid of the toxic substances left in the wound.<sup>[26]</sup>

### XIII. Common Sites of Leeching

*Imamuddin Pakpatani*, has enumerated nearly forty-one parts of the human body where leeches can be applied or various diseases in his book *Kanz-al-mushilin*. Accordingly, to him the leeches may be applied on fontanel, behind the head and neck, forehead, between the shoulders, root of the ear, over the scapula, below the breasts, around the umbilicus and uterine region, the root of penis, the pelvis, below the axillaries, around the kidneys, below the thigh and the shanks, the sole of feet, the astragalus, the liver, the elbow, between the fingers and supra-aural parts, etc.<sup>[30]</sup>





**Fig. 7: Role of Nurses in managing the Leech therapy in Hospitals.**

#### **XIV. Role of Nurse in Leech Therapy**

Nurse has a crucial role in application and monitoring leech therapy. The nurse should monitor the area of leech therapy 10 to 15 minutes once to prevent the migration of leech into other areas and spontaneous detachment. Besides, nurse should assess the skin temperature every 3 hours, and must do skin assessment, pulse detection and haematological laboratory evaluations every 4 hours during the longstanding application of leech therapy. Observe the signs and symptoms of infection and monitor ongoing bleeding and oozing.

##### **A. Follow-Up Care**

- Plenty of water or juices like cranberry juice, blackcurrant juice, pomegranate juice, tomato juice, or coconut juice/water to be taken after a treatment.
- Do not take alcohol.
- The day after the treatment, an individual may take a shower
- Use 3% hydrogen peroxide to wipe and disinfect the treated area.
- Put dressing over the treatment area(s) with a small bandage as long as there is oozing.
- Individual may have some sort of mild swelling, itching, and superficial bruising.
- Itching can be treated with cold moist wraps or lemon juice – squeeze 1/2 of a lemon into 3 cups of water, dip a wash cloth in it and apply to the wound area.
- Do not touch the wound. It is important to avoid scratching the area as it delays healing.
- Localized inflammation is relatively uncommon, however it can occur.
- You might notice a temporary enlargement of the lymph nodes. This is part of the detoxification process and will go away on its own.
- You might feel tired and sleepy, or energetic and vigorous.

- All of these reactions are common and normal.
- Activities such as physical therapy, massage, lymphatic drainage, reflexology, aromatherapy, acupuncture, jogging, biking, intensive swimming, weight lifting, and running should not be performed on the day of a leech therapy session and for 48 hours after a session.
- After 2 days, an individual can resume his or her normal activities unless contraindicated otherwise.

#### **CONCLUSION**

Today, especially in the fields of re-constructive and microsurgery, leeches are benefited for sustaining the vitality of the tissue and skin grafts that are under threat of venous congestion. Anticoagulant feature of Hirudin, found in leech saliva, is of great importance for treatment and prevention of thromboembolic disease. More experimental studies should be carried out in order to develop various application areas. The possible complications and hygiene should be paid attention to during the leech therapy. Leech therapy has a long history, going from popular and well accepted, to falling out of favour and being thought of as an unscientific home remedy, to coming back into current medical practice with strong scientific support. Leech therapy can safely and effectively have used to evacuate peccant/morbid humours from deeper tissues and cure numerous disorders as indicated by Unani scholars. Nowadays, leech therapy came back to the contemporary medicine with fewer applications, which were proven and supported by a huge number of scientific studies and case reports. The most effective and suitable technique of leech therapy for each disorder and symptom should be optimized, while field of leech application should be explored. In addition, Unani clinician should set the standards of operating procedure for leeching and should validate leech therapy in different diseases on modern clinical parameters.

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