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Leeching in the History-A Review

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Abstract: Leeching has enjoyed a good reputation in the past where it had been used in various ailments from fevers to flatulence. The present day scientists have limited its role and the leeching nowadays is being used only in microsurgeries to relieve the venous congestion. This study was designed to explore the possibility of revival of the leech therapy (leeching) which is still being used traditionally as therapeutic agent in various ailments. Leeching is not the outcome of the medieval period but has been in use during the times when there was no concept of the disease and medicament. The earliest clearly documented record of leeches being used for remedial purpose appears in a painting in an Egyptian Tomb of around 1500 BC. The journey of the leech therapy reached its zenith in 17th and 18th century AD in Europe while as during the Arab era the leeches were used medicinally but only for the bloodletting. During the 17th and 18th century AD there was shortage of leeches in certain European countries due to its rigorous use. During early 20th century AD when germ theory was put forward and medical fraternity believed that every disease has its origin from germs and the era of antibacterial therapy gained a pace, the leech therapy was considered the myth of the past. It was in 1970's that the leech therapy was revived by only limited to the microsurgeries to relieve venous congestions. During the 21st century there were certain studies when the leeches were tried in certain ailments like arthritis etc. and the Food and Drug Authority of USA (FDA) gave permission for sale and use of leeches in USA but limited its use in microsurgeries and plastic surgeries only. The aim of this study was to explore different diseases where the role of leech therapy can be seen and clinical trials can be started in this direction. Although the researchers in Regional Research Institute of Unani Medicine, Srinagar, Kashmir, India working under the aegis of Central Council for Research in Unani Medicine started the clinical trials for leech therapy in frost bite way back in 1999, but there are certain unexplored areas where leech therapy can prove beneficial and need is to take up the studies on other disease on larger sample size.

Key words: Leeching, bloodletting, *Hirudinaria medicinalis*, hirudin, hirudinase

INTRODUCTION

Bloodletting is an ancient art which archaeologists have now dated to the Stone Age after recent discovery of bloodletting tools in that culture (Glasscheib, 1964). The first records concerning bloodletting by cutting vein, or venesection, were found in the Hippocratic collection in the 5th century BC. Early practitioners let blood to eliminate the peccant humors in an attempt to restore health. Plethora or an overabundance of body humors is considered as unhealthy in Unani System of Medicine also. The idea laid down by renowned physicians of the past like Hippocrates, Galen, Avicenna, Razes etc. Leeches are being instrumental in helping to rid the body of plethora painlessly. Leeches and the medical practitioners have been closely associated for centuries. Five thousand years ago, Egyptian medics believed that letting a leech sip a sick patient's blood could help cure everything from fevers to flatulence. In medieval Europe,

leeches were so closely associated with doctors that physicians were called "leeches" and they used millions of the parasites annually to treat patients. The earliest clearly documented record of leeches being used for remedial purpose appears in a painting in an Egyptian tomb of around 1500 BC. The term leech was used to designate English Physician.

It has been reported that the first person to use leeches medicinally may have been Nicandros of Colophon (200-130 BC) and soon thereafter, Thmison of Laodicea (123-43 BC) a pupil of Aesculpius (Major, 1954).

During the Roman Era, Galen (129-189 AD) promoted leeching because he believed that bloodletting would rid the body of noxious substances produced by disease. By doing so it could restore the four humors to proper balance. Avicenna (978-1037 AD), the great Arab Physician, believed that leeches drew blood from deeper sources than did wet cupping. In his world famous book The Canon of Medicine (Alqanoon-fi-Tibb) he has

devoted several pages for instructions on leeching and description of leeches to be used medicinally (Grunner, 1930).

The description of leech is also found in Kitabul Umda Fi Jarahat written by Ibne Maseehi (1233- 1286 AD), where he has mentioned the characteristics of poisonous leeches. The leeches described for the medicinal use include mash colour leeches, blackish red leeches, liver colour leeches, yellow colour leeches, thin leeches resembling to mice tail etc. (Maseehi, 1986).

The leeches became popular mode of bloodletting in 18th and 19th century AD. Their use peaked in 1830 in France when Brousius, the most sanguinary physician in history was practising (Castiglioni, 1948). He believed that every disease could be traced to an inflammation, that is, excessive accumulation of blood in one part of the body.

Numerous indications for leeching include acute laryngitis, nephritis, nephralgia, subacute ovaritis, epistaxis, swollen testicles, ophthalmia and brain congestion (Adams, 1988).

In acute gastritis, application of 20 to 40 leeches was recommended. Even leeches were applied over the spermatic cord in epididymitis, on the temple in ocular inflammation.

Between 1829 and 1836 AD the use of leeches became more popular and approximately 5 to 6 million leeches were used yearly.

In 1870 edition of American Dispensatory, the authors described the regimen necessary for maintenance of the leeches and how to prevent the putrefication of water containing leeches (Adams, 1988).

The leeches can ingest an amount of blood almost 10 times its own weight and may digest the bout of blood for as long as 12 to 18 months during which time the leech will not bite (Lent, 1985). Leech could suck 5 to 15 mL of blood which would then be broken down by the flora of the gut of the parasite (Busing *et al.*, 1953).

One reference from Medieval England refers to bloodletting by leeches in a Latin written by Aldhelm of Malmesburh (7th or 8th century AD) and may be translated as I bite unfortunate bodies with three-furrowed wounds and bestow a cure from my healing lips (Cameron, 1993).

Von Rosenstein, in the first printed text book on diseases of children advocated leeching for difficult dentition, tooth abscess, convulsion, scarlet fever, pleurisy, or inflamed eyes. Regarding diseases of the throat he wrote. "We know very well what an incomparable effect blistering has in a rheumatism, toothache, in common sore throat and in all colds or rheumatisms in what place so eve; so that there is reason to expect a good effect in this disease likewise. But

bleeding and leeches ought, without dispute, to have been used beforehand (Von Rosenstein, 1776)".

Thomas treatise on domestic medicine, written in 1822, advocated leeching: Topical bleeding may be performed in two ways, viz., wither by application of leeches or cupping. Leeches are highly useful and can be applied to the most delicate parts as eyes, gums, breasts and testicles etc. where cupping can not be employed. He also mentioned continued bleeding after the leech drops off should be encouraged. Mention of medicinal leeches in Australia dates back to 1824 AD (Thearle, 1998). Although, the same thing has been mentioned in Avicenna's Cannon of Medicine way back in 980 AD.

The leeches belong to the phylum Annelida and there are about 650 species of leeches in the class Hirudinea. The leeches in use medicinally are *Hirudinaria medicinalis*, *Hirudinaria asiatica* and *Hirudinaria manellensis*. The name *Heridunaria medicinalis* was given to the leeches used medicinally by Linnaeue in 1758 AD.

METHODS OF APPLICATION

The techniques of application of leeches today are not much different from Avicenna's prescribed methods. His precise description and logical methods 1000 years ago should humble modern healers, who forget that they stand on the shoulders of a number of giants. Avicenna's insistence on cleaning not only the leeches but also the application site and the applicator's hands is common antiseptic sense that Holmes, Semmelweis and Lister rediscovered for themselves 800 years latter and struggled to prove to resistant colleagues (Robert *et al.*, 2000).

The leeches once used should never and never be reused, but should be destroyed in 70% alcohol where it gets killed. The part should be prepped well and nothing should be applied to the part having pungent smell as it repels the leeches. If the leech do not stick to the part well then a drop of sugar water should be applied to the part and in certain cases some blood is being oozed by pricking the part so that the leech sticks it. The leeches should be kept hungry for the overnight. The temperature should be maintained between 5 and 15 degree centigrade as leeches do not stick in severe cold and extreme hot seasons. The lean leech should be selected for the purpose. The saline or alcohol swab encourages the leech to drop.

PRESERVATION OF LEECHES

The leeches are to be preserved in the pharmacy in fresh spring water. The water needs to be changed every

day or twice daily depending on the temperature. Traditionally the leeches are being kept in earthen pots as the pores present in the pot keeps the atmosphere for the leeches cool. The temperature should be maintained between 5 and 15 degree centigrade. Do not use distilled water for the storage purpose as it leads to the ion depletion of the leeches. If distilled water is to be used then the commercially available salt (Hirudosalt) should be added to it. Otherwise the fresh spring water or the dechlorinated water can be used.

DISCUSSION

Although, Haycraft in 1884 discovered that a substance from leech saliva was powerful anticoagulant (Haycraft, 1884) but the use of leech for the medicinal purposes dates back to 1500 BC. It was believed that the leeches suck the bad blood which later on proved to be wrong notion, instead the leech is a blood sucking animal which sucks every type of blood. The leeches were used for almost every ailment and in the past if the physician could not get the time to see the patients on the same day he used to say to the attendants to subject the patients for leeching till he would visit in the morning. The leeches were also used after the patient gets cured so as to remove the paccant humors which get accumulated in the body. In Unani System of Medicine the bad humor's which get accumulated in the body need to be removed (Istefragh) by various methods like vanesection, purging, emesis, diaphoresis, leeching etc. especially after the winter season due to less work and exercise the bad humor (Ikhlate-fasida) get accumulated in the body and need to be removed. In the valley of Kashnir since centuries the people opt for leeching on 21st of March every year as this date marks the end of the winter. Though the people with different diseases through the leech vendors but it has been observed that healthy people also opt for leeching on that day (Younis, 2002).

The advances in medical sciences have proved that the leeches can work wonders. Recent studies have proved that efficacy of leech extract in cosmetics. The leeching has proved very beneficial in microsurgeries (Derganc and Zdravic, 1960), in ailments like frostbite (Younis, 2005), essential hypertension and different types of arthritis. In a study conducted in Germany, the effectiveness of leech therapy in osteoarthritis of knee was established. The patients (n = 51) received a single sting of leeches (4 to 6 in number). The primary end point pain at day 7 was reduced from 53.5±13.7 to 19.3±12.2 in leeching group compared to the control group where the pain was reduced from 51.5±16.8 to 42.4±19.7 with topical diclofenac application (Michalsen *et al.*, 2003). In this

study, the outcome was measured with WOMAC criteria which is subjective one, so we at RRIUM, Srinagar which is a unit of CCRUM, New Delhi started the work in this direction and the outcome is being measured on basis of reduction in joint swelling which is the only objective parameter. The study is going on in a positive direction and the results seem to be encouraging.

In another study, the hirudin was tested for thrombin inhibition in synovial inflammation in Antigen Induced Arthritis (AIA). The study was conducted on animal models where experiments showed hirudin did indeed significantly attenuate the severity of AIA as measured by both ^{99m}Tc uptake and synovial histology. The intra-articular fibrin staining was reduced by hirudin treatment. There was a clear reduction seen in synovial inflammation by hirudin (Vrisco *et al.*, 2000). The hirudin as a potential therapeutic agent for arthritis has also been advocated by K Scott, Professor in University of Auckland, New Zealand (Scott, 2002) and synovial stimulatory protein (SSP) acting as auto-antigen to which T-Lymphocytes from patients with rheumatoid arthritis respond identified in synovial fluid has been found to bind to a hirudin-agarose affinity chromatography matrix (Bush *et al.*, 1998).

The major enzymes of leech saliva having different functions are as under:

- Hirudin : The most well known enzyme, a powerful anticoagulant in existence, than heparin.
- Bdellin : A protease inhibitor thus acts as anti-inflammatory.
- Apyrase : A powerful platelet anti-aggregate factor thus making blood flow more fluid.
- Eglin : It is also an inhibitor of inflammation but at the same time it is antioxidant.
- Destabilase : This enzyme has very powerful platelet anti-aggregating activity which acts by dissolving the blood clots, thus opening up very exciting therapeutic avenues.
- Hyaluronidase : It acts both as a factor for diffusion and as an antibiotic.
- Lipase and Esterases : Used for hyperlipidemia.
- Anti-Elastase : This substance acts by limiting the action of Elastases which degrade cutaneous elastin particularly at the level of skin.
- Vasodilatory substances : These substances have not yet been identified but it is very similar to histamine.

There are other important enzymes in the bio-energetic processes such as neurotransmitters which are secreted by the 34 cerebral nodes distributed along the body of leeches.

The leeches also produce catecholamines which act on the nerve terminators, particularly at the level of the skin which are Dopamine, Serotonin and Acetylcholine, which is so important in leeches that the official method for assaying acetylcholine in tissue is based on a biological method involving the contractility of the leech's dorsal region.

So on and so forth the leech has been termed as pharmaceutical manufactory by the scientists and it was on these observations that in 2004 the FDA of USA allowed the marketing and growing the leeches for the medicinal purposes.

There is a good scope for the study on the efficacy of leeching in different diseases and RRIUM, Srinagar has been successfully doing the work in this direction from 1998 onwards. We are also in the process of establishing a leech bank so that the laboratory propagation of leeches can be done, successfully.

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