Review Article

www.ijrap.net

(ISSN Online:2229–3566, ISSN Print:2277–4343)

PAIN MANAGEMENT BY LEECH THERAPY: A REVIEW

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Received on: 24/1/24 Accepted on: 09/4/24

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DOI: 10.7897/2277-4343.15389

ABSTRACT

Pain is a common symptom of several illnesses that are treated with medicinal leech treatment. Its mechanism of action is based on injecting leech saliva into the tissues of patients while they are having blood drawn. Active components found in leech saliva have anti-inflammatory, thrombolytic, anticoagulant, and blood- and lymph-vascular-stimulating effects. There isn't a known particular analgesic compound in leech saliva. In many cases, leech treatment provides quick, efficient, and long-lasting pain relief. More than twenty bioactive compounds have been found in leeches' secretions, including carboxypeptidase inhibitors, guamerin, hirudin, saratin, bdellins, complement, and antistasin. In addition to their extracellular matrix degradative and antibacterial properties, they also serve as analgesics, anti-inflammatory, platelet inhibitory, anticoagulant, and thrombin regulators. However, more research may expand their range of actions. The method's mechanisms of action for certain diseases have been clarified, and it is inexpensive, efficient, and simple to use. It has recently discovered novel uses in the treatment of cancer, hypersensitivity diseases including asthma, male and female infertility, and diabetes. Researchers are continuing to identify and synthesise a growing number of novel salivary chemicals for use in clinical and private practice due to the growing therapeutic potential of leech treatment. In conclusion, leech therapy is a complimentary and/or integrative option rather than a replacement for the treatment of various disorders.

Keywords: Leech therapy, Hirudin, Anti- inflammatory, Anticoagulant

INTRODUCTION

In Ayurveda, leech treatment, also called "Jalaukavacharana" (Hirudio therapy), was used for therapeutic "blood-letting" and "purification," and it was thought to be able to treat a wide range of conditions, including headaches, gout, skin conditions, blood problems, alopecia, filariasis, and other symptoms. Ample evidence of the long and rich history of leech therapy can be found in Pharaonic tomb paintings from 1500 BC, Sanskrit writings from 1300 BC, and classical Greco-Roman reports.[1-3]

Throughout history, various societies have employed hirudo-therapy, the medical use of leeches for therapeutic purposes. Classified as members of the phylum Annelida and the class Hirudinida, leeches are bloodsucker, hermaphrodite worms with uses in a variety of medical fields. Numerous medical diseases, including blood-clotting disorders, arthritis, varicose veins, and other circulation abnormalities, have been treated with them.

Patients suffering from varicose veins, post-surgical oedema, arthritis, and other pain-related ailments might find relief with leech therapy. This is because their saliva has vasodilatory and anticoagulant qualities that promote blood flow and guard against blood clots. Leeches can aid in promoting healing and minimizing tissue death by eliminating extra blood and inhibiting clotting. It has proven possible to effectively treat severe lumbar pain caused by cancer using leech treatment.[4]

There is uncertainty about the precise processes via which leech treatment might reduce pain. Leech treatment may have direct anti-inflammatory and analgesic benefits in addition to a potential placebo effect due to the components of leech saliva. It is believed that platelet-derived growth factor (PGF) is a major contributor to the signals of neuropathic pain in the spinal cord. In mice, thermal hyperalgesia and tactile allodynia have been shown to be suppressed by intrathecal injection of Hirudin, which inhibits PGF release[5]. Leech saliva contains chemicals that have been identified as having analgesic and anti-inflammatory properties, which have been specifically linked to osteoarthritis. Nevertheless, compared to symptomatic osteoarthritis, an anti-inflammatory activity is less likely to be significant for chronic non-specific back pain. In the roughly 60 minutes that the application.

Peptides, proteins, small organic molecules, hirudin, hyaluronidase, collagenase, kallikrein, histamine-like vasodilators, and some poorly characterised anaesthetics and analgesics with beneficial effects like anticoagulation, improved blood circulation, thrombolysis, vasodilation, and anti-inflammatory properties are among the active substances found in leech saliva. Although the precise analgesic compound present in leech saliva is yet unclear, clinical data indicates that it is beneficial. The fact that leech bites hurt less often than other wounds suggests that a painkiller was present when the leech bit. The discomfort felt during leech administration immediately goes away as the biting begins.[5]

Leech saliva contains compounds that block cytokines with anti-inflammatory chemicals, blocking the cascade of pain reactions and providing analgesic relief. Leech saliva contains protease-inhibiting chemicals that block cytokines that cause pain and reduce inflammatory responses. Following leech application,

there may be brief itching, mild oedema, and localised inflammation; nevertheless, this is also the time when the therapeutic pain-relieving benefits should start to manifest[6].

Less aggressive therapies, such as leech therapy, might be considered a stopgap in individuals who are medically high-risk, elderly, or hesitant to have surgery. This clinical trial's objective was to determine if leech treatment for chronic pain is clinically helpful.

The biology of leech feeding

Leeches are classified into two main types according on their dietary patterns. The first category consists of the rapacious leeches, which eat a wide variety of invertebrates. The second category of ectoparasites, known as sanguivorous leeches, consumes vertebrate blood, including that of humans[7]. The biting teeth and suckers of leeches allow them to take in blood from their target.[8] It's noteworthy to note that leeches typically take 2–20 ml of blood every 10–30 minutes, at which point they naturally stop feeding after becoming fully engorged.[9,10]

In their gut, leeches—both sanguivorous and predatory—digest their meal. Only months' worth of blood can be stored inside the bodies of sanguivorous animals. Hematophagous leeches really go through several sluggish phases in their blood digesting process, which enables them to retain blood for up to 18 months. Aeromonas spp., a symbiotic bacterium found in leeches' stomach, release enzymes that aid in both the breakdown of the blood's constituent parts and the production of antibiotics to stop blood putrefaction during a protracted time of storage in leech crops. Additionally, it is believed that these enzymes prevent B complex insufficiency, which frequently arises in animals that depend on blood nutrition.[7,11]

Modern application of leech therapy

Reconstructive and microsurgery

When replanting tissues or severed fingers, microsurgery is a type of surgery performed under a microscope with the goal of anastomosing tiny blood vessels, veins, and arteries.[12] While venous occlusion poses a major risk to recently donated tissues and can result in thrombus development, stasis, and ultimately tissue necrosis, arterial thrombosis is uncommon. Therefore, medical professionals contended that reducing venous congestion is essential to reducing this risk and preserving these transplanted tissues.[12,13] Because leech saliva contains long-acting anticoagulants, this causes both the aggressive blood drainage that comes from the leech sucking motion and the slow leaking that occurs after leech separation led medical professionals to employ leeches to treat venous congestion.[12,14] The cumulative impact of the leech bite-induced blood leaking, which is caused by a number of variables such as a bleeding wound, bioactive enzyme produced, anticoagulants, and vasodilators, is the relieving effect .[13] Conversely, plastic surgery specialists saw leeching as a potentially effective treatment, since they saw that leech bites typically cure Y-shaped lesions without problems or scarring.[10] Although there are no worldwide guidelines for leech therapy, some have claimed that using leeches for a week is enough to provide positive results.[14,15] There have been no published controlled studies on the use of medicinal leeches in microsurgery, hence all information on the subject is based on case reports and case series.[13]

According to reports, leeching has proven an effective treatment for restoring blood flow following microsurgery for a severely avulsed scalp (one that was torn away by an accident). Normal hair growth was seen throughout the damaged regions of the scalp, indicating partial salvage.[16] In 1984, a group of doctors treated seven patients with engorged (swollen) skin flaps using leech treatment. For 2-4 days, they applied leeches 2-4 times a day.[17] Leeching, they observed, avoided flap collapse with mild problems and a considerable improvement in colour. Completely severed ears were also decongested with leeches.[18] Eight patients who had amputation injuries and replantation and revascularization procedures were treated by others using a four-day leeching course. Four patients were described as having a favourable response and regaining normal circulation.[19] Planting again More over half of the treated patients were reported to be fully salvageable.[20] Others have suggested that vascular endothelial growth factor and leech bloodletting may enhance flap survival.[21] Additionally, leech treatment was recommended as a postoperative measure for patients undergoing fingertip replantation surgery.[22] More recently, a few medical professionals reported using leech successfully to save an ischemic finger. The patient reported improved feeling and sensitivity to pinpricks at the top of the finger on the seventh day of therapy.[23]

Arthritis and analgesic

Numerous studies on individuals with osteoarthritis found that using leeches had higher pain-relieving effects than topical diclofenac, all without any negative side effects[24]. Similarly, hirudin has been shown in certain studies to suppress DING protein, a synovial stimulatory protein derivative that acts as an autoantigen in rheumatoid arthritis patients, hence reducing synovial inflammation in those with arthritis[25]. In a different trial, a group of women with localised osteoarthritis in their first carpometacarpal joint were treated with two to three leeches. Every patient who received treatment reported improved disability and decreased discomfort. After one week of treatment, leeching was shown to be effective, and this effect persisted for at least two months[26].

Leech treatment was shown to be a beneficial way to lessen the need for painkiller intake in individuals with advanced osteoarthritis in the knee, according to another scientific investigation. Research has shown that compared to a single treatment session, a double treatment regimen spaced four weeks apart demonstrated improved physical activity and longer lasting alleviating effects[27]. Additionally, the efficiency of using the traditional Unani herbal composition in conjunction with leech therapy was evaluated. Patients who got the combination therapy showed improved functional abilities and decreased pain and stiffness[28]. According to some findings, leech treatment can be used as an analgesic for cervicobrachialgia syndrome and pain in the ilio-sacral joints[10].

CONCLUSION

In summary, although hirudo-therapy may appear to be an unusual medical procedure, its efficacy in treating a wide range of ailments has been extensively studied. Leeches may become an even more significant instrument in contemporary medicine and environmental monitoring as research on their uses grows. Leech treatment is a locally administered and systemically acting therapy in transdisciplinary sciences that is less intrusive, affordable, practicable, and readily available in clinics and hospitals to be delivered to patients in need of pain relief.

In patients who are medically vulnerable, elderly, or unwilling to have surgery, less intrusive therapies, such as leech therapy, may be used as a stopgap. Thus, leech therapy should be viewed as a beneficial choice for the non-pharmacological/non-invasive treatment of pain. This experiment offers more convincing proof that leech treatment is most likely a useful strategy for treating persistent regional pain disorders affecting the whole musculoskeletal system. Combining stimulating therapies with

the noticeable symptom improvement from leech therapy might be worth a try. However, a larger sample size of patients is required to yield more conclusive results, and the current study is limited by its small number of participants.

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Cite this article as:

Ajay Pratap Singh and Devesh Shukla. Pain management by Leech Therapy: A Review. Int. J. Res. Ayurveda Pharm. 2024;15(3):150-152
DOI: http://dx.doi.org/10.7897/2277-4343.15389

Source of support: Nil, Conflict of interest: None Declared