

# DOES THE USE OF HIRUDOTHERAPY REDUCE PAIN? A NARRATIVE REVIEW

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## ABSTRACT

**Background:** Leeches therapy, also known as hirudotherapy, is one of the oldest methods used in medicine. Hirudotherapy treatments are increasingly used as a useful therapeutic method in the treatment of various diseases as an independent and complementary therapy. The method is used, among others, to treat pain, circulatory system diseases, diabetic complications, and arthritis. It is also effectively used by surgeons to treat venous diseases, hematomas, and wounds.

**Aim of the study:** This article aimed to review the literature on hirudotherapy and its impact on eliminating pain.

**Material and methods:** The analysis included articles from the PubMed and Google Scholar databases, including publications from 2010 to 2024. The keywords used were: leeches medicinal, hirudotherapy, pain.

**Results:** A total of 15 out of 29 articles were qualified for the review. The search resulted in four randomized controlled trials, five case reports, two case series, two systematic reviews, and two meta-analyses. The research shows that the use of hirudotherapy can be an effective method in the treatment of pain in various clinical conditions. Both clinical studies and case reports confirm the effectiveness of this method for relieving pain.

**Conclusions:** At this stage, it can be concluded that hirudotherapy can be an independent or supportive therapy in the treatment of pain in various diseases. Studies have differed regarding the use of leeches to treat pain. An important issue is determining the appropriate leech use regimen, including the number of leeches, frequency, and duration of use.

**KEYWORDS:** leeches medicinal, hirudotherapy, pain

## BACKGROUND

Leech therapy, also known as hirudotherapy, is one of the oldest methods used in medicine. The first use was recorded in ancient Egypt in 1500 BC, and it became very popular at the turn of the 18th and 19th centuries [1]. In recent years, medical leech therapy has been used, among other therapies, to treat pain, circulatory system diseases, diabetic complications, and arthritis. It is also effectively used by surgeons

to treat venous diseases, hematoma, and chronic wounds [2].

The mechanism of action of hirudotherapy has not been fully explained. The *Hirudo Medicis* species is most often used in medicine. During application, leeches release saliva, which contains over 100 biologically active substances, into the wound. Substances with analgesic and anti-inflammatory effects have been identified in leech saliva. Leech saliva contains a powerful anticoagulant called hirudin, which

prevents blood from clotting, promotes blood flow, and prevents blockages. By sucking, leeches naturally extract blood, reducing the pressure in the affected area [3].

There are contraindications to the use of hirudotherapy. This method is not recommended primarily in the case of bleeding diathesis, anticoagulant treatment, liver cirrhosis, leukemia, during dialysis, chemotherapy, and radiotherapy [4].

Hirudotherapy treatments are increasingly used as a valuable therapeutic method in the treatment of various diseases as an independent and complementary therapy. Leech treatment brings quick, effective, and long-lasting pain relief. Therefore, the article attempts to assess the current state of knowledge about the impact of hirudotherapy on reducing pain in various diseases.

## AIM OF THE STUDY

The article aimed to review the literature on hirudotherapy and its impact on eliminating pain.

## MATERIALS AND METHODS

The review of scientific reports used articles available in the PubMed and Google Scholar search engines.

## Eligibility criteria

English-language articles were analyzed, and publications from 2010 to 2024 on research involv-

ing humans were included. The work included meta-analyses, systematic reviews, clinical trials, and case reports.

## Search strategy

Articles available in the PubMed and Google Scholar databases were used for the analysis. Keywords used: leeches, medicinal, hirudotherapy, pain. The final search took place on April 14, 2024.

## Data collection process

Each author reviewed the literature independently. Data were collected on the effect of hirudotherapy on the reduction of pain in various diseases. A total of 29 articles were identified. Abstracts were analyzed, followed by full-text articles. Papers that did not meet the inclusion criteria were not included. Our study excluded review and review articles relating to the history of hirudotherapy and works describing only side effects. A total of 15 articles were included in the review. As a result of the search, four randomized controlled trials, five case reports, and two case series were identified. The review also included two systematic reviews and two meta-analyses.

## RESULTS

A total of 15 articles out of 29 were qualified for the review. The results are presented in Table 1, including four clinical studies, five case reports, and two case series.

Table 1. Characteristics of included articles

Author	Publication year	Type of study	Type of disease	Number of patients (n)	Type of therapy	Dosage	Number of treatments	Pain assessment methods
Backer et al.	2011	randomized controlled trial	chronic lateral epicondylitis	20	leeches	2–4 pcs.	1 treatment	VAS
				20	Diclofenac-Natrium 10 mg/1 g gel	2 tubes	30 days	
Stange et al.	2012	randomized controlled trial	osteoarthritis of the knee	22	leeches	8 pcs.	1 treatment	VAS
				18	TENS	10 min	1 treatment	
Isik et al.	2017	randomized controlled trial	osteoarthritis of the knee	46	leeches	5 pcs.	3 treatments	VAS
				44	TENS	1 time a day 20 min	15 treatments	
Hohmann et al.	2018	randomized controlled Trial	low back pain	25	leeches	4–7 pcs.	1 treatment	VAS
				19	exercise therapy	1 hour per week	4 treatments	
Zaidi	2016	case report	diabetic foot gangrene	1	leeches	4–5 pcs.	3 months	VAS

Table 1 contd.

Author	Publication year	Type of study	Type of disease	Number of patients (n)	Type of therapy	Dosage	Number of treatments	Pain assessment methods
Asgarii et al.	2017	case report	treating Priapism	1	leeches	2 pcs.	2 treatments	—
Kuldiba et al.	2019	case report	complex regional pain syndrome	1	leeches	1–3 pcs.	5 treatments	NRS
Affi et al.	2021	case report	peripheral artery disease	1	leeches	4 pcs.	10 treatments (2 times a day for 5 days)	VAS
Marquez-Gil et al.	2023	case report	hematoma evacuation	1	leeches	2 pcs.	1 treatment	—
Loeser et al.	2020	case series	arthritic pain in patients with various chronic pain syndromes	24	leeches	no data	1 treatment	—
Nair et al.	2022	case series	ulcers/wounds	3	leeches	4–5 pcs.	2 do 4 treatments	—

## DISCUSSION

Research carried out in various countries has shown that the use of hirudotherapy can be an effective method for treating pain in various clinical conditions. Clinical results indicate a strong and long-lasting effect in reducing pain and improving functional status. Both clinical studies and case reports confirm the effectiveness of this method in relieving pain.

In a 2014 systematic review, Koeppen et al. point to clinical evidence of the effectiveness of hirudotherapy, which has been documented in controlled and uncontrolled studies and case reports in patients for whom pain is a significant part of various clinical conditions. The review included studies indicating the reduction of pain in, among others, osteoarthritis of the knee joint, spine pain, varicose veins, and ulcers. In addition, the work focused on reducing pain and swelling after surgery. The authors draw attention to insufficient scientific evidence on the dosage of therapy and suggest further scientific research to establish an appropriate treatment protocol [5].

A systematic review and meta-analysis conducted in 2014 by Lauche et al. presents evidence of pain reduction after hirudotherapy in patients with knee osteoarthritis. Due to the small number of adverse events after the procedure, they recommended leech therapy for this condition. At the same time, they indicated the need to conduct further clinical work to ultimately assess the effectiveness of this method [6].

Similarly, to evaluate the effectiveness and safety of medicinal leech therapy in patients with knee osteoarthritis, in 2018, Wang et al. conducted a meta-analysis of randomized controlled trials. The authors confirmed the effectiveness of hirudotherapy in relieving pain and returning patients to functional ca-

capacity. Their study showed that side effects were mild and did not require treatment. However, further RCTs are necessary due to the moderate quality of evidence and limitations of the included studies [7].

The latest meta-analysis from 2024 conducted by Rajaram et al. presents an assessment of medicinal leech's effectiveness in treating venous stasis during all breast surgeries. A total of 18 studies were analyzed, including four case series and 14 case reports. On average, two leeches were used on patients three times a day for three days. Results showed an overall success rate of 75% when using medicinal leeches in breast surgery to remove venous stasis [8].

Backer et al. (2011) conducted a randomized controlled trial on 40 patients with symptoms of chronic lateral epicondylitis randomly assigned to one of the comparison groups. Patients from the first group received a single hirudotherapy treatment. Patients from the comparison group used Diclofenac-Natrium 10mg/1g gel topically for 30 days. The effects were assessed after seven and 45 days; the use of leeches resulted in a significantly stronger reduction in pain intensity compared to topical diclofenac. The hirudotherapy procedure was safe and caused only local itching and minor bleeding at the treatment site. The authors recommended the use of leeches as an additional therapeutic option [9].

Researchers from Germany (2012) conducted a participatory study on patients with active degenerative knee joint disease. Forty patients were randomly assigned to two comparison groups. In the first group (n=22), patients underwent a single hirudotherapy treatment; in the second group (n=18), patients received a TENS treatment. Single leech therapy showed more significant pain reduction and functional improvement compared to the TENS

group. The authors recommended hirudotherapy as an effective form of pain relief in patients with active degenerative knee joint disease [10].

An interesting RCT was carried out in 2017 by Isik et al. (2017), who, like the German study, compared the effectiveness of medical leech and TENS therapy in treating primary knee osteoarthritis. Ninety patients participated in the study; 46 received three hirudotherapy treatments (once a week for three weeks), and 44 had 15 TENS treatments (5 times a week for three weeks). Therapy was assessed after 21 and 180 days. Studies have shown that leech therapy is as effective as TENS therapy and relieves pain in patients with knee osteoarthritis [11].

Hohmann et al. presented a 2018 study on the effect of hirudotherapy on chronic low back pain. The study included 44 patients who were randomly assigned to two comparison groups. Patients from the first group (n=25) had a single session of local treatment using 4–7 leeches; in the second group (n=19), four weekly sessions of exercise therapy (1 hour each) were performed. At the end of the project, it was found that pain reduction after 28 days was significantly greater in the leech group, and functional improvements and improvements in physical quality of life were more visible in the leech group after 28 and 56 days. The authors believe that leech therapy seems to be an effective method of treating chronic low back pain [12].

Evidence for the effectiveness of hirudotherapy is presented in the case reports presented.

Zaidi (2016) described the case of a 60-year-old woman suffering from diabetic foot syndrome and at risk of amputation; the patient felt severe pain (8/10 VAS). Topical treatment sessions were applied by applying four leeches to the gangrenous area of the foot. The treatments were repeated after 7 and 15 days, then every 15 days. Within almost 3.5 months, the necrotic areas disappeared, and the wound was completely healed. After hirudotherapy, the pain score decreased to 0/10 on the VAS scale within 20 days, and there was no need for further analgesic treatment [13].

Asgarii et al. (2017) presented a case report of a 26-year-old man with symptoms of priapism (priapism is a persistent erection without sexual stimuli). The patient reported severe pain and swelling of the perineum. For therapy, two leeches were used on both sides of the penis shaft for one hour. The patient's antimicrobial prophylaxis included intravenous ceftriaxone (1.5 gr twice daily) and antihistamines for seven days. The pain and swelling of the perineum completely disappeared within one month of the therapy, and no complications were noted during this time [14].

The beneficial effects of hirudotherapy were described by Kuldiba et al. (2019) in the case of a pa-

tient with chronic complex regional pain syndrome (CRPS) in the right hand. The cause of the pain was a fracture of the fourth and fifth metacarpal bones of the right hand. The patient experienced constant pain, swelling, and redness in the affected area. The treatment included five sessions of hirudotherapy, which led to a quick and significant relief of symptoms, especially in pain intensity, and improved mobility of the affected limb [15].

However, Afifi et al. (2021) described the case of a 50-year-old man with peripheral artery disease (PAD). The patient experienced severe pain, tingling, and numbness in his right foot. Hirudotherapy was used, and two treatments were performed every day for five days. Then, the treatments were repeated once a week. After six months, the patient experienced pain relief without numbness, burning, or tingling [16].

Marquez-Gil et al. (2023) described the case of a patient who developed a hematoma causing pain, redness, and swelling after an invasive procedure on the right thigh. To drain the hematoma, two medicinal leeches were applied for 45 minutes. After the procedure, there was a significant improvement in erythema, feeling of warmth, swelling, and pain, and a significant reduction in the size of the hematoma was observed. Complete wound healing was achieved within two weeks after surgery [3].

Our review included two papers reporting case series.

Loeser et al. (2020) retrospectively analyzed the effect of a single leech on osteoarthritis joints in 24 patients with various chronic pain syndromes. The study assessed the severity of joint pain and the mobility of the treated joint after one leech application. A significant reduction in the intensity of pain in the joint was observed after using the leech for up to 12 months after treatment. Improvement in pain intensity was independent of the type of osteoarthritis treated. A significant improvement in local mobility of the treated joint was also observed. The authors indicate that hirudotherapy has great potential as a complementary therapy, especially regarding safety and long-term results [17].

An interesting pilot study of a series of three cases was conducted by Nair et al. (2022). They assessed the effectiveness and healing time of wounds in patients with ulcers and abscesses using sterile medicinal leeches. In each case, leeches were used 2 to 4 times, and 4–5 leeches were applied simultaneously. The results showed that in all patients, hirudotherapy effectively reduced pain and helped with perfusion, which helps wounds heal faster [18].

The literature on hirudotherapy primarily concerns case reports, with few RCTs and systematic reviews. This review found that leech treatment was associated with reduced pain and improved functional

ability. The use of hirudotherapy in the treatment of pain in various diseases can be considered both as a basic and complementary therapy.

### Limitations of study

The presented study has several limitations. It should be emphasized that this is not a typical systematic review but a subjective review of research. We have shown small sample sizes, mainly due to the lack of evidence on this topic. The mechanism of hirudotherapy use presented in this review indicates the use of various regimens. The differences concerned the number of leeches, the duration of therapy, and the method of assessing the effects. The studies described showed an increased risk of mild side effects that did not require further treatment. It would be advisable to pay special attention to side

effects (type, frequency, duration). Further research is needed to verify the long-term effects and assess the potential benefits of this method. Future studies could focus on comparing leech therapy and conventional therapeutic methods.

### CONCLUSIONS

This literature review allows us to conclude that leech therapy/hirudotherapy may be an independent or supportive therapy in the treatment of pain in various diseases. The literature on hirudotherapy mainly consists of case reports, with few RCTs and systematic reviews. An important issue is determining the appropriate leech use regimen, including the number of leeches, frequency, and duration of use. Therefore, further high-quality randomized clinical trials are required to evaluate and confirm effectiveness.

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