

## Leech Therapy as an Alternative Therapy for Osteoarthritis of the Knee Joint: A Case Series

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### How to cite this article:

Tukaram Dudhamal, Shiv Sagar, Manisha Kapadiya/Leech Therapy as an Alternative Therapy for Osteoarthritis of the Knee Joint: A Case Series/Indian J of Ancient & Yoga. 2023;16(1): 35-39.

### Abstract

Osteoarthritis (OA) (degenerative joint disease) is the most common joint disorder. It mostly affects cartilage. The top layer of cartilage breaks down and wears away. Osteoarthritis is of two types, primary (idiopathic) and secondary. In idiopathic osteoarthritis, the most common form of the disease, no predisposing factor is apparent. Secondary OA is pathologically indistinguishable from idiopathic OA but is attributable to an underlying cause. The non-steroidal anti-inflammatory drugs are the main drugs of choice in modern medicine which have lots of side effects and therefore are not safe for long-term therapy. Raktamokshan, i.e., bloodletting is one of the primeval and important para-surgical procedures defined in Ayurveda for the treatment of numerous diseases. Among them, leech therapy has expanded greater attention worldwide, because of its therapeutic values. The saliva of leech comprises numerous biologically active constituents, which have anti-inflammatory as well as anaesthetic belongings. This case series comprised five cases of knee joint osteoarthritis managed through two sittings of leech application at the interval of 15 days. Complete pain relief with normal range of motion of knee joint noticed after 1 month of treatment. Leech therapy is one of the remedies under investigation, given its claimed analgesic and anti-inflammatory properties.

**Keywords:** Anti-inflammatory; Ayurveda; Jalauka; Leech therapy; Osteoarthritis, Raktamokshan.

## INTRODUCTION

The use of leeches (*Hirudo medicinalis*) has been popular throughout the ages, and still has a place in Ayurveda as well as modern medicine, especially

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Received on: 17.11.2022

Accepted on: 19.12.2022



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in skin diseases as a blood purifier, reconstructive and microvascular surgery, pain, inflammatory, and vascular diseases. The commonly used treatment for pain associated with osteoarthritis non-steroidal anti-inflammatory drugs (NSAIDs) is frequently associated with undesirable side effects;<sup>1</sup> repeated leech application can supply symptomatic relief of osteoarthritic pain for extended periods. thus, in the search for alternative forms of treatment, leeching has received renewed interest. Interestingly, leech therapy's popularity has increased in India's complementary and alternative medicine.

Knee osteoarthritis is the most common joint disease in India. Ten percent of adults over the

age of 55 years suffer from this painful, disabling ailment.<sup>2</sup> Even a modest pain relieving effect from leech therapy would be of interest to public healthcare.

**Case 1:** 60 years old retired male came to the outdoor patient department (OPD) with complaints of right knee joint pain and swelling, stiffness of the right knee joint with decreased range of motion since the last 8 years. The pain gradually started and continuous type aching pain increased during walking, climbing stairs and squatting. On examination tenderness at the mid-joint line. There was no joint deformity, muscle weakness or atrophy. X-ray of the right knee joint anterior-posterior (AP) and lateral demonstrated decreased joint space, marginal osteophytes and soft tissue swelling present (Image 1). Total leucocyte count was 7100/cu mm, random blood sugar 134 mg/dl, serum uric acid 3.2 mg/dl, bleeding time 1.30 minutes, clotting time 3.50 minutes. Virology profiles like human immunodeficiency virus (HIV), HBsAg, and hepatitis C virus (HCV) are non-reactive found.

**Case 2:** A 42 year old housewife visited OPD with complaints of intermittent pricking type right knee joint pain, swelling in the right knee joint, stiffness, crepitus and decreased range of motion in the knee joint since last 6 months. Pain increased during walking, climbing stairs, and squatting. Knee joint stiffness noticed in the morning persist for 2-3 minutes only. X-ray of the right knee anterior-posterior and lateral view showed mild patella-femoral osteoarthritis (Image 2). Total leucocyte count was 4900/cu mm, random blood sugar 93 mg/dl, serum uric acid 2.8 mg/dl, bleeding time 1.30 minutes, clotting time 3.50 minutes, RA factor 7.7 IU/ml. Virology profiles like HIV, HBsAg, HCV are non-reactive found.

**Case 3:** A 64 years old retired male patient complains of dull aching type of gradually started pain at the right knee joint that increased during the night with joint swelling and stiffness for the last 6 years.

Crepitus and restricted joint movement in the right knee joint. Stiffness persists for 5-10 minutes in the morning and relief by movement. There was no any deformity in the knee joint. Moderate patella-femoral osteoarthritis and osteophyte formation found in X-ray anterior-posterior view of right knee joint (Image 3). Total leucocyte count was 5900/cu mm, random blood sugar 75 mg/dl, serum uric acid 4.6 mg/dl, bleeding time 1.30 minutes, clotting time 4.50 minutes, RA factor 7.6 IU/ml. Virology profiles like HIV, HBsAg, HCV are non-reactive found.

**Case 4:** A 40 years old working woman presented with intermittent pricking pain at the left knee joint since for 2 years. Swelling at the knee joint persisted for the whole day. Crepitus, Stiffness and decreased range of motion was noted in left knee joint since 1.5 years. Pain and stiffness increased after walking, during squatting position, and climbing stairs. X-ray of the left knee joint confirmed moderate degenerative changes with patellofemoral joint osteoarthritis (Image 4). Total leucocyte count was 10,800/cu mm, random blood sugar 96 mg/dl, serum uric acid 3.1 mg/dl, bleeding time 1.40 minutes, clotting time 5.50 minutes, RA factor 4.6 IU/ml. Virology profiles like HIV, HBsAg, HCV are non-reactive found.

**Case 5:** A 55 years old middle class farmer female patient came to OPD with complaints of gradually started continues type pricking pain at the left knee joint for the last 4 years. It was subside after taking NSAID twice a day. Swelling at both the lateral side of the knee for 4 years which persisted for the whole day. Stiffness, crepitus and restricted range of motion of the left knee joint for the last 3 years. There was a genu varus deformity of the left knee in the past 1 year. X-ray of the left knee demonstrates that moderate medial joint space decreased with patella femoral joint OA changes and osteophyte formation (Image 5).

## RADIOLOGICAL INVESTIGATIONS



Image 1



Image 2



Image 3



Image 4



Image 5

## CLINICAL ASSESSMENT

Clinical symptoms of knee osteoarthritis were assessed on the basis of grading of Pain (VAS), Crepitus, Stiffness, knee joint ROM like flexion and extension (range of motion) before and after completion of treatment. (Table 1)

**Cases management:** All cases were managed through two sittings of leech application in 15 days interval.

### Leech application procedure

Informed written consent was taken from all patients prior to procedure. *Yavagu annapana* advised all patients 1 hour before of the procedure. Purification of leech by pouring the leech in water mixed with turmeric powder. The most tender

point of the affected knee joint was wiped with normal saline. The leech tried directly on the affected area for the bite. If the leech was not bitten then the skin was pricked with a sterile needle. When the leech started to suck blood then it was covered by a wet cotton pad (Image 6). After 30-50 minutes of blood sucking the leech, itself detached from the joint. The site was cleaned with normal saline, followed by dressing with turmeric powder. Turmeric powder was applied to the mouth of the leech so it vomits all sucked blood (Image 7). Gentle pressure was applied to remove the remaining blood in Leech. After proper *Vamana* (emesis) leech was put in a separate container indicating the name of the patient. The patient was allowed to sit for 20 minutes before leaving the place to check for bleeding.



Image 6: Leech application at knee joint



Image 7: Jalauka Vamana



Image 8: Jalauka bite mark

## RESULT

Case	Pain	Crepitus	Stiffness	Extension	Flexion	Hb (gms%)	ESR (mm/hr)
Case-1							
BT	8	2	2	180°	150°	12.4	70
AT	2	1	0	180°	130°	11.3	68
Case-2							
BT	6	2	2	180°	140°	14.5	14
AT	1	1	1	180°	130°	14.2	10
Case-3							
BT	5	2	2	170°	140°	11.6	100
AT	2	1	1	180°	130°	10.6	96
Case-4							
BT	7	2	2	180°	150°	12.1	52
AT	3	2	0	180°	130°	12.6	46
Case-5							
BT	6	2	2	-5°	140°	14.2	68
AT	2	1	0	-5°	130°	14.6	64

**Table 1:** Changes in clinical signs, symptoms, aKnee joint pain, crepitus and stiffness, flexion affected in all patients while extension affected in only one patient. After two sittings of leech application noticeable knee pain decreased in all cases. Improvement in crepitus from grade 2 to 1 observed in all cases except case 4. Among 5 cases, stiffness completely resolves in three cases. Most of the patients presented with normal extension except only one case which was improved from 170° to 180°. Flexion upgraded from 140° to 130° in three cases while two cases upgraded 150° to 130°. All cases reached up to normal flexion of knee joint. Changes noted in Hb and ESR after leech application was insignificant. nd laboratory parameters;

## DISCUSSION

The saliva of leeches contains several substances that have not been completely characterized. Most prominent among these are hirudine and other antihemostatic factors, hyaluronidase, histamine-like vasodilators, collagenase, inhibitors of kallikrein and superoxide production, and Antistatin, Hirustatin, lantens, Elgin, complement C1 inhibitor, Guamerin and Pigumerin, Carboxypeptidase inhibitor, Bdelins and Bdelastasin are Analgesic and anti-inflammatory compound. The substance found in the secretion of leech helps to reduce pain.<sup>3</sup> There is still no conclusive clarification for the pain reducing outcome of leech therapy. These substances spread into deeper tissue and the joint cavity may be made possible by hyaluronidase, but it remains unclear whether or not these substrates reach the synovial membrane or the synovia, and what effect they may have on the cartilage and subchondral bone. Scott pointed out that along with the capacity to inhibit thrombin, hirudin also inhibits the synovial stimulatory protein (SSP/DING) a growth factor for synovial fibroblasts while possessing anti-inflammatory properties.<sup>4</sup> It may also be possible that the local analgesic, blood thinning, and anti-inflammatory components are improved by the indirect effect of prolonged isolated bloodletting. This can only be clarified by testing each individual component of leech saliva. Leech derived tryptase inhibitor (LDTI) and inhibitors of leucocyte elastase were found in leeches' saliva.<sup>5</sup> Therefore, regional analgesic and anti-inflammatory properties of these substances enforced by hyaluronidase as a dispersion factor might be possible. Hirudin could possibly contribute to an enhancement of local tissue perfusion and tissue decongestion. Increased tissue perfusion

helps to get rid of local inflammatory substances which seems to be relevant for pain relief in the knee joint pain. By ingesting excess blood, leeches reduce tissue swelling and promote healing. This is important for the treatment of arthritis because as the vasodilation, it increased the blood flow, thus removing inflammatory compounds from the local site, ultimately patients get relief in pain, swelling, stiffness thereby improve range of movement of knee joint.<sup>6</sup>

Leech therapy could have a place as an added suggestive treatment modality for osteoarthritis. In case of failure of the conventional non operative and surgical treatment modalities or after consideration of current contraindications, leech therapy might be an effective option.

No any adverse effects were observed in all these treated cases. Patients must be informed about the minor initial burning pain, local irritation at the site of application, with mild itching developed and the possibility of small leech bite scars. These symptoms had ebbed in all individuals by 4 weeks, and healed completely in all cases. It is not expected blood loss by the application of four to five leeches in one application. Mild oozed-out bleeding well managed by tight bandaging. Leech therapy seems to be better approach in a patient without any severe comorbidity. *Aeromonas hydrophila* a bacterium normally found in the intestinal flora of leeches and therefore physiologically present in their saliva.<sup>7</sup> So, there is a possible chance for septicaemia and infection. But no wound infection or systematic symptoms were noted in any patients.

## CONCLUSION

Leech therapy led to fast and relevant symptomatic relief in painful conditions like osteoarthritis of Knee joint as found in five cases. Considering the side effect of long-term use of NSAID and analgesics, limited options of conventional treatment and the increasing healthcare burden of knee osteoarthritis, this effective and traditional alternative modality should be evaluated in a larger sample size for longer observation periods.

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