

THE ROLE OF *JALAUKAVACHARANA* AND *PRALEPA* IN THE MANAGEMENT OF
VRANASHOPHA- A REVIEWYogesh Badwe*¹ and Geeta Jaybhaye²¹Professor and HOD, Department of Shalyatantra, Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra, India.²PG Scholar, Department of Shalyatantra, Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra, India.

*Corresponding Author: Yogesh Badwe

Professor and HOD, Department of Shalyatantra, Shri Ayurved Mahavidyalaya, Nagpur, Maharashtra, India.

Article Received on 28/07/2021

Article Revised on 18/08/2021

Article Accepted on 08/09/2021

ABSTRACT

Introduction: In today's modern era management of *Vranashopha* (Cellulitis) is a challenging task because there is an increasing demand of cosmetic treatment with minimal or no scar. *Jalaukavacharanava* i.e. Leech therapy is a novel gift of *Ayurveda* to the modern world. Leech therapy is an ancient technique of blood-letting. Leech saliva contains numerous bioactive constituent which possesses anti-inflammatory, antioxidant, anti-coagulant, analgesic, vasodilator, thrombolytic, and blood circulation enhancing properties. *Acharya Vagbhat* has also mentioned *Jalaukavacharana* in inflammatory diseases like *Vranashopha*. *Vranashopha* is *Raktapradoshaja vyadhi*, it is characterized by localised swelling, discoloration, burning sensation and pain. In *Ayurveda*, *Sushruta* has mention *Jalaukavacharana* as one of the most effective therapy. He has also mention *Alepa* as a second choice of treatment for *Vranashopha* in *Shashtiupakarma*. Panchavalkala *Pralepa* shows anti-inflammatory Properties. In this article the role of *Jalaukavacharanava* and *Pralepa* is revealed. **Material and Methods:** The related data is collected from various dissertations, published research articles from search engines like Google Scholar, Pub med journals and from the classical texts of *Ayurveda*. **Result:** In this study exciting results were found in the reduction of pain and swelling after use of *Jalaukavacharana* as well as reduction of pain, redness and swelling was found after use of *Pralepa*. **Conclusion:** *Jalaukavacharana* and *Pralepa* was useful in the reduction of all symptoms of *Vranashopha*. So, it can be used in the treatment effectively.

KEYWORDS: *Vranashopha*, *Jalaukavacharana*, Leech therapy, Cellulitis, *Pralepa*.

INTRODUCTION

Vranashopha (Cellulitis) is a primary symptom or initial stage of *Vrana*.^[1] Detailed description of *Shopha*, its classification, symptoms, complications and management is mentioned in *Charaka Samhita* but as far as its surgical aspect is concerned, it is well defined by *Sushruta*, the father of ancient Indian surgery. *Sushruta* has defined *Vranashopha* as a localized swelling in any part of body involving the skin and the underlying flesh which may be even or uneven, massive and knotty or nodular in consistency. As per the pathogenesis is concerned, it is described that the vitiated *Vata Dosha* first displaces *Kapha*, *Pitta* and *Rakta* and pushes them to different channels of the body. Further, these morbid elements obstruct the path of *Vayu* and causes accumulation of *Kapha*, *Pitta* and *Rakta* in between *Twak* (skin) and *Mamsa* (muscle) which results in a *Shopha*.^[2] *Charaka* has mentioned three types of *Shopha* *Vataja*, *Pittaja* and *Kaphaja*.^[3] while *Sushruta* has mentioned six types of *Shopha*; *Vataja*, *Pittaja*, *Kaphaja*, *Sannipattaja*, *Raktaja* and *Agantuja*.^[4] *Sushruta* believed that the process of the pathogenesis has a definite sequential pattern, consisting of six stages or what may

also be called as the six occasions for the treatment called as *Shat-Kriyakala*.^[5] In case of *Vranashopha*, the disease may manifest in three stages; *Amawastha* (stage of early inflammation), *Pachyamanawastha* (stage of true inflammation) and *Pakwawastha* (stage of suppuration) with its own symptoms.^[6] Sign and symptoms of *Vranashopha* are similar to cellulitis.^[7] Cellulitis is spreading type of inflammation of subcutaneous tissue generally associated with bacterial infection. Characteristic features of inflammation i.e. Pain, Redness, Tenderness, Swelling are landmarks of Cellulitis.^[8] Anti-inflammatory and antibiotic drugs are used to control this condition, with their limitations and side effects.

Sushruta has described seven principle measures to treat and manage various stages of *Vranashopha*. *Shata-Kriyakala* is very unique concept of *Ayurveda* which not only explains the pathogenesis of a disease but also reminds the clinician about the importance of an early and prompt diagnosis and treatment to avoid complications.^[9] *Jalaukavacharana* is used in a variety of inflammatory conditions. Its mode of action depends

on the injection of leech saliva into patient's tissues during the process of blood sucking. It contains various bioactive constituent which possesses anti-inflammatory, analgesic, thrombolytic, antioxidant, vasodilator, anti-coagulant and blood circulation enhancing properties. Hirudotherapy is an ancient bloodletting technique firstly described in *Ayurveda* by the name of *Jalaukavacharana*.^[10] Removal of vitiated *rakta* is very necessary for the complete cure of these diseases that is known as *Raktamokshana* (Bloodletting) in *Ayurveda*.^[11] According to *Chakradatta Panchavalkala Pralepa* is also used in *Vranashopha* it shows Anti-inflammatory Properties, to reduce all the inflammatory sign and symptoms.^[12]

OBJECTIVES

Objectives- To review the effectiveness of *Jalaukavacharana* and *Pralepa* in the management of *Vranashopha* through various available literature.

MATERIALS AND METHODS

The related data was collected from various dissertations, published research articles and from search engines like Google scholar, Pub med journals and from the classical texts of *Ayurveda*.

OBSERVATION AND RESULT

Dr. Vivek Anantwar has conducted study on *Jalaukavacharana* in *Vranashopha* as a PG dissertation. In this study total 30 patients were included for treatment and duration was 7 to 15 days. Pain was reduced by 77.22%, local temperature was reduced by 66.66%, Burning sensation was reduced by 66.66%, Swelling was reduced by 33.33%, Tenderness was reduced by 54.54%, Redness was reduced by 58.18% was. The conclusion drawn was *Jalaukavacharana* is helpful in the reducing the symptoms of *Vranashopha* (Cellulitis).^[13]

Dr. Akbar Walandkar. has conducted study on *Panchavalakala lepa* in *Aghantuj Vranashopha* as a PG Dissertation. Total 60 patients were included in this study. Divided into two groups -group A treated with local application of Glycerin-Magsulf dressing and group B treated with *Panchavalakala lepa* was undergone in this study daily for 7 days and then the follow up was taken till treatment completed. The criteria was Pain, Colour, Temperature, Tenderness and Oedema, then result obtain is approximately same in both groups. The overall effect is 87% patients where completely cured in experimental group, while 77% patients completely cured in control group. Total 60 patients 11 (18.3%) are not cured, while 49(88.3%) are completely cured in the study. Average number of days require for complete recover in experimental group is smaller than in control group. So, the study was concluded that *Panchavalakala lepa* is reducing the symptoms of *Vranashopha* earlier as compare to Glycerin-Magsulf dressing.^[14]

Comparative clinical trial conducted by Dr.Y.Badwe and Dr. A. Paliwal on *Punarnavadi lepa* with *Jalaukavacharana* in *Vranashopha*. Total 40 patients were studied in which 20 patients treated with *Punarnavadi lepa* and 20 patients treated with *Jalaukavacharana*. In both groups internally *Amrutadi Guggulu* 500mg 2 tablets 3 times a day with luke warm water was given for the duration of 07 days follow up will be taken after 15th day. According to this study *Lepa* was applied once in a day, while *Jalauka* was applied daily for 7 days. *Punarnavadi Lepa* found statistically significant with ($p < 0.02$) and where *Jalaukavacharana* found highly significant with ($p < 0.001$) in the pain management. *Sthanik Utsedha* where found highly significant in both the group and P value is $P < 0.01$ and $P < 0.001$ in group A and group B. Both groups were found statistically highly significant in the reduction of *Sthanik Ushama* (Local Temperature) with P value is ($p < 0.001$) in both groups. So, the conclusion was drawn *Jalaukavacharana* reduces in the period of 7 days, which is lessar than the *Punarnavadi Lepa* in *Vranashopha*. *Jalaukavacharana* found more effective in *Vranashopha*.^[15]

Randomized Controlled Trial were conducted by Dr. Anil K. Tripathi on Leech Therapy in cellulitis. In which 42 patients where randomized in 3 groups, the first group (group A)- is treated by Antibiotics and Analgesics, group B is treated by Leech therapy with *Ayurvedic* formulation (*Shigru Guggulu* 500 mg BD), Group C- Treated by only Leech application was done. Clinical criteria considered was Swelling, Pain, Redness, Tenderness and Discharge and Diagnostic Haematological Criteria was Hb, TLC, DLC, ESR, BUL, Serum Creatinine, LFT, BT, CT, HIV. Clinical criteria in all the 3 groups where highly significant in the reduction of Pain, Redness, Swelling and Tenderness and discharge in group A was non-significant, while other both group is highly significant. In haematological study non-significant result found in HB%. Highly significant result was found in 3 groups, in the reduction of leucocyte count and polymorphs. Highly significant result was found in 3 groups, in the increase of Lymphocyte counts. while in ESR, BUL, Sr. creatinine level, Bilirubin level, SGPT, Alkaline phosphatase level, Serum protein level. Serum albumin level and Clotting time shows statistically non-significant changes was found in all 3 groups. SGOT level shows Statistically non-significant change in group A and B while in group C it is significant. Bleeding time increased after treatment in all groups, statistically it is highly significant in group A, non-significant in group B and significant in group C. The conclusion was made that leech application provide significant relief in cellulitis with provide without alteration in haemoglobin level.^[16]

Randomized Controlled Trial conducted by Dr. Kumar Ravindra et.al, on *Dashang Lepa* in *Vranashopha* with total 20 patients selected for study. They were divided in two sub groups on basis of TLC, Group I- In this group

20 patient with TLC <15,000 cells/mm³. These were further divided in two sub group- IA Control group - These were treated by local application of Su-mag (combination of dried magnesium sulphate 58%, urea 1%, sulphacetamide sodium 2.5%, proflavine and glycerine) and IB Trial group - These were treated by local application of *Dashang Lepa*. No oral medication where describe in this study. Total duration of treatment was given as per required, but for clinical study the data were collected and analysed for 15 days at the interval of 5 days for three successive follow-ups. The drug was applied for 12 hrs. However, the time depends upon site, severity and other factors. Reapplication of *Dashang lepa* was done after cleaning the affected area with normal saline. *Dashang lepa* shows statistically highly significant (p<0.001) in terms of pain, reducing oedema, reduction in tenderness, reduction in erythema (redness), reducing generalized temperature and it also reduces local temperature as compare to ointment Sumag. Another parameter where not provide in this study. The mean before treatment is 2.40 and after treatment is 0.40 in Group IB respectively. So, conclusion was made *Dashang lepa* is more effective for instant relief from fever and other symptoms of *Vranashopha* and has potent anti-inflammatory medicine. The present study showed that the *Dashang Lepa* possessed significant effect against acute inflammation in comparison to magnesium sulphate ointment.^[17]

A case study performed by Dr Monali G. Kurhadkar et.al. on *Panchavalkala Lepa* in 3-year female patient of *Vranashopha* (Cellulitis). Local application of *Panchavalkala Lepa* was done twice a day for 5 days. During these study *Vedana* (Pain) on before treatment and on 1st day it was 3, on 3rd day it was 1 and on 5th day it was 1, *Utsedh* (Swelling) on 1st day 5cm, on 3rd day 3cm and on 5th day 1cm was reduced, *Sthanik Ushma* (Local temperature) on 1st day it was 98.5F, on 3rd day it was 97.5F and on 5th day it was 97.1F. Swelling, Redness, Tenderness and Pain was reduced gradually with the help of treatment and after 5 days child was able to walk without pain. So in present study *Panchvalakala Pralepa* was useful in *Vranashopha* due to its therapeutic action and having good results and taken less time for cure. All over results concluded that *Panchavalkala Pralepa* is beneficial in *Vranashopha*.^[18]

A case study by Dr. Kalmegh M.S on Leech Therapy in Peri-Orbital Cellulitis with no history of insect bite or trauma. 2 settings of *Jalaukavacharana* was done in the interval of 1 day. The peri-orbital edema, pain, swelling and erythema were reduced after 2 settings. The study was concluded that *Jalaukavacharana* is safe and cheaper to reduce the symptoms of cellulitis (*Vranashopha*).^[19]

Another case study by Dr.Rabiya Shaikh was done in 20 year male patient having cellulitis of left leg. Patient was treated with *Jalauka Avacharana* with orally *Triphala guggulu*, *Gandhak rasayan*, *Manjisthadi ghanavati* was

given for 7 days. *Jalauka Avacharana* was done on the day of examination followed by daily wound dressing. Follow up was taken on 15th day for examination of any complications at the site of lesion like formation of hypertrophied scar. So, the Conclusion is *Jalaukavacharana* gives significant relief in the symptoms of *Vranashopha* like *Shopha* (swelling on left leg), *Daaha* (burning sensation), *Suchivada Vedana* (pricking pain).^[20]

Dr. Anil Kumar and Dr. Ashish Sharma studied Significance of *Shatkriyakala* in The Management of *Vranashopha*. Concept of *Shat-Kriyakala* is helpful in diagnosis, prognosis, prevention and treatment of diseases. Present article reviews the significance of *Shatkriyakala* in the manifestation and management of *Vranashopha*. *Shat-Kriyakala* is very unique concept of *Ayurveda* which not only explains the pathogenesis of a disease but also reminds the clinician about the importance of an early and prompt diagnosis and treatment to avoid complications.^[21]

Same review was done by- Dr. Praveen K. Yadav on stage-wise management of *Vranashopha* by *Saptopakrama*. which includes the management at its initial stage (*Amavastha*) through the wound stage (*Vranavastha*) till the management of the complications of the healed wound (*Vaikritapaham*). The first 3 procedure can be used for both *Amavastha* and *Pachyamanavastha*, the 4th for *Pakwavastha*, 5th & 6th for the stage of wound and the 7th for the management of complications of healed wound.^[22]

A Scientific Review, published by Dr. Amit Vaibhava, et.al, Leech therapy it is the mildest and safest methods used for blood-letting. Leech saliva contains numerous bioactive constituent which possesses anti-inflammatory, analgesic, anaesthetic, thrombolytic, antioxidant, vasodilator, anti-coagulant and blood circulation enhancing properties. Leech therapy could be very effective and used in plastic surgery, complicated wounds, abscess and several other surgical conditions. Besides these, there are various diseases like cellulitis, inflammatory reactions, boils and abscesses for improving blood circulation. The frequency of leech application depends according to disease and severity. Commonly Leech should be applied once in a week up to six sittings. One Leech should be reserved for a particular patient to avoid cross infection.^[23]

A Scientific Review in *Ayurveda* on *Jalaukavacharana* (Leech Therapy) by Dr. Snehal Kukade et.al. Leech therapy or *Jalaukavacharana* is an ancient *Ayurvedic* bloodletting technique which having the immense potential to treat inflammatory, ischemic and infective disease conditions. Leech saliva contains a number of bioactive constituents which possesses anti-inflammatory, anticoagulant, anaesthetic, vasodilator, anaesthetic, antibiotic and antioxidant properties acting through multiple mechanisms in different disease

conditions. Unfortunately, most of the bioactive ingredients are still unexplored and there is only limited knowledge of mechanisms of action of bioactive compounds present in Leech Saliva.^[24]

A Brief Review published by Dr.Dighade Shubhangi et.al. on *Jalaukavacharana*, *Jalaukavacharana* (leech therapy) is a non-surgical type of *Raktamokshana* and considered as the most unique and effective method of bloodletting. Leeches are widely used in most of the disorders ranging from skin disease to ischemic heart disease with very successful results. *Raktmokshana* is indicated in treatment of *Rakatajroga*. Individuals with imbalance between *Pitta* and *Rakta dosha* and high level of toxicity are recommended for *Raktmokshana* therapy. Leech therapy is widely used in plastic and reconstructive microsurgery and as a protective tool against venous congestion. Therapeutic effect of leech is due to presence of different bioactive constituents in leech saliva. These bioactive compounds have analgesic, anti-inflammatory, Platelet inhibitory, Vasodilator, Thrombolytic, Anesthetic and antimicrobial effects.^[25]

In Conceptual Review by Dr. Richa Bhardwaj on *Jalaukavacharana*, it was found to be more effective than topical analgesics and anti-inflammatory agents in the treatment of inflammatory conditions. Venous congestion can be best treated with the application of leeches. In most of the skin diseases vitiation of *Rakta dosha* is prime factor and leeches having *Sheeta Virya*, it found to be very effective, so considering this conceptual view it can be postulate that leeches may found beneficial in *Vranashopha*.^[26]

DISCUSSION

In this study total 14 researches were studied out of this 2 Dissertations, 2 RCT, 4 Case studies, 6 Review article were published in various journals. In these studies, different types of *Pralepa* and *Jalaukavacharana* was used in *Vranashopha* as mentioned in *Sushruta Samhita* for reducing the symptoms of *Vranashopha* i. e Pain, Redness, Tenderness and swelling and avoid further complications. The case studies and research trials showed very good results in the reduction of all the symptoms of *Vranashopha* like Pain, Redness, Swelling and Tenderness in *Vranashopha* (Cellulitis) by *Jalaukavacharana* and *pralepa*. As per these studies *Jalaukavacharana* was found more effective than *Pralepa*. So, it is important to know the probable mode of action of both these therapies in the respect of *Vranashopha*.

Probable Mode of Action of *Jalaukavacharana* (Leech Therapy)

The jaws of the leech pierce the skin so that these potent biologically active substances can penetrate into the deeper tissues. The saliva of leeches contains various pharmacologically active substances such as hirudin, hyaluronidase, histamine like vasodilators, proteinase inhibitors and collagenase, inhibitors of kallikrein and

superoxide production & poorly characterized anaesthetics and analgesic compounds. Hyaluronidase (spreading factor), an enzyme in leech saliva, further facilitates the penetration and diffusion of these pharmacologically active substances into the tissues.^[27]

Tissue permeability, restored with the help of hyaluronidase, promotes the elimination of tissue and circulatory-hypoxia as well as local swelling. The persistent bleeding largely potentiates tissue decongestion and also relieve capillary network which decrease venous congestion. positive changes of local hemodynamic and improvement of hemorheology will increase oxygen supply, improve the tissue metabolism, and eliminates the tissue ischemia.^[28]

Importance of *Lepana* Therapy in *Ayurvedic* Treatment

Lepana is best therapy because of its safety and high efficacy in the management of *Vranashopha*. So, we can treat the disease with properties like *deepana*, *pachana*, *raktaprasadana* and *lepana*. *Sushruta* has explained *Pralepa* with numerous herbal drugs as *Pradhantama* treatment of *Vranashopha*. *Nyagrodhadi Gana*, which include *Panchavalkala as Vat*, *Udumbara*, *Ashwattha*, *Plaksha* and *Parisha*, *Panchavalkala* bear *Kashayarasa* and has *Prakshalana*, *Shothahar*, *Vranaropana* and *Twakprasadana* properties, it also possesses antibacterial property as well as anti-inflammatory effect. *Pralepa* itself bears *Raktaprasadana* and *Shothahara* properties.^[29]

CONCLUSION

From this review, it can be concluded that *Jalaukavacharana* and *Pralepa* for local application in *Vranashopha* for instant pain, redness, swelling and fever relief. *Jalaukavacharana* and *Pralepa* is very simple, effective, convenient and cost-effective method for the patient with no or less complication. This procedure can be performed along with other supportive oral or IV antibiotics, anti-inflammatory medicine and completely cure *Vranashopha*. Both can be used simultaneously the effect is enhanced.

REFERENCES

1. Upadhyaya Yadunandana, Madhav Nidanam, Hindi commentary, Chaukhambha Sanskrit Sansthan, Varanasi, India. 31st edition, chap- 41/1, 2002.
2. Shastri A.D., Ayurveda Tattva Sandipika commentary on Sushruta Samhita Sutrasthana: Chapter 17 verse 3. Varanasi: Chaukhamba Sanskrit Sansthan, (Ed.), 2009.
3. Shastri KN & Chaturvedi GN., (Vidyotini commentary on Charaka Samhita Sutrasthana: Chapter 18 verse Varanasi: Chaukhamba Bharati Academy, 2005.
4. Shastri A.D., Ayurveda Tattva Sandipika commentary on Sushruta Samhita Sutrasthana:

- Chapter 17 verse 4. Varanasi: Chaukhamba Sanskrit Sansthan, (Ed.), 2009.
5. Shastri A.D., Ayurveda Tattva Sandipika commentary on Sushruta Samhita Sutrasthana: Chapter 21 verse 36. Varanasi: Chaukhamba Sanskrit Sansthan, (Ed.), 2009.
 6. Shastri A.D., Ayurveda Tattva Sandipika commentary on Sushruta Samhita Sutrasthana: Chapter 17 verse 7-9. Varanasi: Chaukhamba Sanskrit Sansthan, (Ed.), 2009.
 7. Parikh P.D, Study of Raktamokshana with special reference to Jalaukavacharana, MD thesis, Department of Shalya Shalakyas, IMS, BHU, Varanasi, 1971.
 8. Harsh Mohana: Textbook of Pathology. Jaypee Brothers Medical Publishers (P) Ltd. 4th edition, 2000; 114-115.
 9. Dr. Anil Kumar, and Dr. Ashish Sharma, Significance of Shatkriyakal In The Management Of Vranashopha, International Journal of Advance and Innovative Research, 2019; 62(XXI).
 10. Shastri Ambika Dutta, Sushrut Samhita Sutra Sthana, Jalaukavacharaniya adhyaya. Hindi Commentary. 14th Edition. Varanasi. Chaukhamba Sanskrit Sansthan, 2003; 1: 43.
 11. Shastri Ambika Dutta, Sushruta Samhita Sutra Sthan vol-1. Jalaukavacharaniya adhyaya-13/3. Hindi Commentary. 14th Edition. Varanasi. Chaukhamba Sanskrit Sansthan, 2003; 43.
 12. Chakradatta. Chakrapanivirchit Chakradatta, Bhavarthasandeeepini Shri Jagdeeshwarprasad Tripathi. Chikitsasthana-44/5, edition reprint 2040, chaukhambha Sanskrit series office Varanasi, 2040; 345.
 13. Dr. Vivek Anantwar, Vranashopha vyadhimai Jalauka Dwara Raktmokshana -EK Adhyayan: Dissertation of SAM, 1995.
 14. Dr. Akabar Walandkar: "Study the Efficacy of Panchvalkala Lepa in the management of Agantuj Vranashopha": Dissertation of Sumatibai shaha mahavidyalaya, Pune, 2006-07.
 15. Dr. Yogesh Badwe, Management of Vranashopha by Punarnavadi Lepa and Jalaukavacharana –A Comparative Clinical Study, Asian Journal of Multidisciplinary Studies, 3(9) September, 2015.
 16. Dr. Anil K. Tripathi et al, Haematological Study In Patients Of Cellulitis Treated By Leech Therapy, J. Res. Educ. Indian Med., 2011; XVII(3-4): 95-100. ISSN 0970-7700.
 17. Dr. Kumar Ravindra et al: Clinical Study of Dashang Lepa In Vranashopha (Acute Inflammatory Swellings-www.wjpmr.com, 2017; 3(10): 309-312. SJIF Impact Factor: 4.103, ISSN: 2555-3301.
 18. Dr. Monali G. Kurhadkar, et.al., Role Of Panchavalkal Lepa On Management Of Vranashopha (Cellulitis) - A Case Study, 2020; 10(5). PRINT ISSN No. 2249 - 555X | DOI: 10.36106/ijar.
 19. Dr. Kalmegh M. S., Management of Peri-Orbital Cellulitis By Leech Therapy- A Case Study, World Journal of Pharmaceutical Research, SJIF Impact Factor 8.074, 2020; 8(6): 569-574. ISSN 2277-7105.
 20. Dr. Rabiya Shaikh et.al, Role Of Jalauka Avacharana In The Management Of Vrana Shopha: A Case Report World Journal of Pharmaceutical and Life Sciences WJPLS www.wjpls.org SJIF Impact Factor: 5.088, wjpls, 2019; 5(7): 99-103. ISSN 2454-2229.
 21. Dr. Anil Kumar, and Dr. Ashish Sharma, Significance of Shatkriyakal in The Management Of Vranashopha, International Journal of Advance and Innovative Research, 2019; 6(2): (XXI):
 22. Dr. Praveen K. Yadav, et.al; Implication of Saptopakrama In Stage-Wise Vranashopha Management-A Review, European Journal of Biomedical and Pharmaceutical sciences <http://www.ejbps.com>, ejbps, SJIF Impact Factor 6.044, 2020; 7(6): 207-212. ISSN 2349-8870.
 23. Dr. Amit Vaibhav et al: Leech therapy (Jalaukavacharana) in Ayurveda: A Scientific Review, IJPPR, July 2016; 6(4).
 24. Dr. Snehal Kukade et.al, Jalaukavacharana (Leech Therapy) A Scientific Review in Ayurveda: European Journal of Molecular & Clinical Medicine, ISSN 2515-8260, 2021; 08(01).
 25. Dr. Dhingade shubhangi et al: Jalaukavacharana (Leech Therapy) Its Indications And Complications - A Brief Review, IAMJ, ISSN: 2320-5091, Impact Factor: 6.719.
 26. Dr. Richa Bhardwaj et.al, A Conceptual Review Of Jalaukavacharana; Review article, IJAPR, 2019; 7(1). ISSN: 2322 - 0902 (P) ISSN: 2322 - 0910.
 27. Dr. Zaidi, S. M., et.al, A systematic overview of the medicinal importance of sanguivorous leeches, Altern med rev., 2011; 16(1): 59-65.
 28. Dr. Bhoomi Soni et.al, a review on mode of action of jalaukavacharana in modern perspective world journal of pharmacy and pharmaceutical sciences, SJIF Impact Factor 6.647, 6(03): 422-436. ISSN 2278 - 4357.
 29. Dr. Monali G. Kurhadkar et.al; Role of Panchavalkala Lepa on Management of Vranashopha (Cellulitis) - A Case Study, 2020; 10(5). PRINT ISSN No. 2249 - 555X | DOI: 10.36106/ijar.