



REVIEW ARTICLE

An Ayurveda Biology approach on the pathogenesis and management of varicose vein

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Abstract

Varicose veins are dilated, twisted veins that usually develop on the legs and feet, affecting both superficial and deep veins. They are commonly seen in adults and can be influenced by factors like aging, genetics, pregnancy, constipation, obesity and lifestyle. Common symptoms include a feeling of heaviness in the lower limbs, muscle cramps, edema, itching around the swollen veins and pain either throughout the leg or in the lower portion. Although the exact cause of varicose veins is not fully understood, it is believed to involve factors such as increased pressure in the veins, weakened vascular walls, faulty valves and genetic predisposition. The symptoms of varicose veins are more similar to those of *Siragranthi*, a condition described in Ayurvedic texts. While modern treatments mainly focus on managing symptoms, Ayurveda offers a comprehensive approach, including conservative methods and para-surgical procedures. From an Ayurveda biology perspective, bloodletting procedures like leech therapy (*Jaloukavacharana*) and venesection (*Siravedha*) aim to restore balance by addressing circulatory imbalances and promoting detoxification. Modern scientific evaluations, such as changes in blood viscosity, inflammatory markers, oxygen saturation and circulation, can help assess the clinical effects of these treatments. This combination of traditional and modern approaches enhances our understanding of how bloodletting may support vascular health and manage conditions like varicose veins. Though not life-threatening, varicose veins can disrupt daily life and the condition worsens over time, making it important to conduct a review on this topic.

Introduction

The evolution of Homo sapiens to an upright posture marked a significant milestone in human development. However, this adaptation also made humans more prone to certain health issues, particularly varicosities in the lower venous system. In a sense, these varicosities are the penalty Homo sapiens pay for their ability to walk on two legs, as four-legged animals are naturally immune to this condition.¹

Varicose veins are enlarged, swollen and twisted veins, often caused by malfunctioning valves, primarily affecting the lower limbs². Superficial veins or deep veins could be affected. Most of the varicose veins are commonly seen on the thighs and the back of the calf muscles and they are less commonly visible on the inner side of the legs. They are most common in adults and can be influenced by factors such as aging, genetics, pregnancy, constipation, obesity, lifestyle, etc. A heavy achy feeling with itching area or burning sensation and worsening with extended period of standing are the symptoms of varicose veins.³ Even though varicose veins are not a threat to life they can impair day-to-day activities and conditions aggravate with chronicity. Although the precise etiology of varicose veins is uncertain, it is thought to involve elevated intravenous pressure, weaker vascular walls, incompetent valves and genetic predisposition. Varicosities result from the pooling of blood and vein dilatation caused by weakening or damage of vein valves. Effective management and relief of varicose veins depend on understanding the causes, symptoms and available treatment options.

Varicose veins are a global health problem affecting 10-20% of the population worldwide. In India, approximately 5% of the population is affected by this condition.⁴ The signs and symptoms of varicose veins closely resemble those of *Siragranthi*, a clinical condition described in Ayurvedic texts. Contemporary treatments of these condition often focus on symptom management, Ayurveda offers a holistic approach including conservative management and Para surgical procedures. Para-surgical treatments primarily involve *Rakthamoksha* (blood-letting) procedures, such as *Jaloukavacharana* (leech therapy) and *Siravedha* (venesection).

Ayurveda Biology can be defined as the fine tuning of the concepts of Basic Sciences accommodating the relevant principles of Ayurveda. Thus, it becomes essential to clarify that bloodletting procedures, such as leech therapy (*Jaloukavacharana*) and venesection (*Siravedha*), do not directly eliminate the doshas (*Vata*, *Pitta* and *Kapha*). Instead, these techniques aim to restore balance by addressing circulatory system imbalances and facilitating detoxification. Modern scientific evaluations, including the measurement of changes in blood parameters such as blood viscosity, inflammatory markers, oxygen saturation and circulation, can provide valuable insights into the clinical impact of these treatments. By assessing these factors, we can better understand how these traditional practices may influence vascular health and complement modern approaches to managing conditions like varicose veins

Objectives

To explore the pathogenesis of varicose veins from an Ayurvedic biology perspective and examine effective treatment modalities.

Methodology

The sources of information include classical Ayurvedic texts, contemporary Ayurvedic textbooks, modern medical science literature and published articles from various journals.

Varicose vein in Ayurveda

Varicose veins closely resemble *Siragranthi*, a clinical condition described in Ayurveda.

Causative factors

The factors that can contribute to the development of *siragranthi* can be summarized as⁵

- improper diet including food that aggravates *vata* (dry, cold and irregular meals)
- consuming too much-processed food
- excessive salt intake and spicy food can lead to *pitta* imbalance and inflammatory conditions
- excessive physical exertion (*shramathiyogath*), lifting heavy weight (*bharavahana*), long walks (*adhwagamana*)
- intake of *guru* (heavy), *manda* (mild), *hima* (cold) and *snigdha* (unctuous) food

Pathogenesis according to Ayurveda

In the pathogenesis of *Siragranthi*, it has been mentioned that *Vata* vitiates *Rakthadhatu* (blood tissue) due to factors such as excessive walking, physical strain and other similar causes. This results in the *sankochana*, *sampeedana* and *visoshana* (narrowing, constriction and drying up) of the *sira* (veins), leading to the formation of *Siragranthi*. The changes in the veins cause them to become *samkuchit* (constricted), leading to tortuosity. Due to the *ruksha guna* (dry quality) of the vitiating *Vata*, the veins become rough and hard, a condition referred to as *visoshana*. Ultimately, the veins appear swollen, painless and non-pulsatile, which is characteristic of varicose veins.⁶

Clinical features of *siragranthi*⁷

- *Sankocha* in *Sira* (veins tortuosity)
- *Vakrata* in *sira* (irregular surface of veins)
- *Utsedha* in *sira* (vein inflammation)
- *Vishoshana* in *sira* (roughness and hardness of veins)

Prognosis of Siragranthi

In the context of *Siragranthi*, Acharya Sushruta discusses the severity of the condition based on its progression and suggests suitable treatment methods. He states that if the *granthi* is characterized by pain with mobility, it becomes harder to treat. Likewise, if the *granthi* is large, fixed and located at vital points (*marmasthana*), it is also hard to manage and considered *kruchrasadhya* (challenging to treat).⁸ Susruta's description of *granthis* underscores that the progression of the condition and its severity depend on factors like pain, size, mobility and location. *Granthis* that are painful, mobile, large and located at vital points are difficult to treat because they are more likely to involve deeper tissues, complicate interventions and pose a higher risk to vital bodily functions. Therefore, the treatment becomes more challenging, often requiring advanced techniques and interventions.

Predisposing factors for varicose vein

The risk factors include heredity, being female, occupations that require prolonged standing, immobility, increased intra-abdominal pressure (such as in sports, tight clothing, pregnancy and elevated progesterone levels), an altered estrogen-progesterone ratio, chronic constipation and wearing high heels.⁹

Prolonged standing

When standing for long periods, the combined effect of gravity and the weight of the blood puts pressure on the weakened valves in the veins. This leads to valve failure, resulting in varicosity of the long and short saphenous veins. Additionally, during prolonged standing, the calf muscles remain inactive, preventing the calf pump mechanism from effectively pushing venous blood upwards

Pregnancy

Pregnancy is known to increase the likelihood of developing varicose veins and they are particularly common in women who have had multiple pregnancies. Pregnancy contributes to the formation of varicose veins through various mechanisms

Progesterone leads to the dilation and relaxation of the veins in the lower limbs, which can result in valve incompetence. This hormonal effect is most prominent during the first trimester of pregnancy. Additionally, the growing uterus exerts pressure on the inferior vena cava, obstructing venous blood flow, with this effect being more noticeable in the third trimester. After each pregnancy, both the hormonal and mechanical factors subside, leading to an improvement in varicosity. However, during subsequent pregnancies, these factors reoccur, causing the varicose veins to worsen, which is why varicose veins are more commonly

seen in multiparous women

Old age

Ageing causes the atrophy and weakening of the vessel walls. Additionally, with age, the valves in the veins become less efficient and may become incompetent

Obesity

Excess fat in the subcutaneous tissue provides inadequate support to the veins, contributing to the development of varicosity

Athletes

Varicose veins can sometimes be observed in athletes. Intense contraction of the calf muscles may push blood through the perforating veins in the reverse direction, damaging their valves. Over time, this damage can lead to the formation of varicose veins.¹⁰

Pathophysiology of varicose vein

Under normal circumstances, blood flows from the superficial to deep veins through competent perforators, aided by muscle pumps, valves and negative intra-thoracic pressure. When this mechanism fails due to valve damage from deep vein thrombosis or superficial venous issues, blood pools, causing varicose veins. Prolonged immobility can increase venous pressure in the ankle to 80-100 mm Hg, leading to edema, but even mild calf muscle activity can reduce this pressure to 20-30 mm Hg

Ayurvedic management of siragranthi

In Ayurveda, the management of varicose veins includes conservative management and para-surgical treatments. Conservative management involves the use of medicinal formulations both internally and externally, compression stockings or bandages, mild exercises to strengthen calf muscles, yoga practices and avoidance of prolonged standing and tight clothing. In the advanced stages of varicose veins, *Rakthamoksha* procedures like *Siravedha* and *jaloukavacharana* are generally practiced, depending on the patient's condition.

Ayurvedic Formulations used in Siragranthi

In a varicose vein, administration of internal & external medicines includes *kashaya*, *gudika*, *churna*, *lepa* and *thaila* which are *Vatanulomana*, *rakthaprasadaka*, *soolaprasamana*, *sophahara*, *kandugna* in nature. These are administered to the patient depending on the signs and symptoms presented. It is generally considered effective for attaining symptomatic relief, preventing progression and supporting overall vascular health. Lifestyle modifications are also suggested along with medications.

Ayurvedic formulations recently found suitable in Varicose Veins' management¹¹

	<i>Mahamanjishtadi kashayam</i>
	<i>Vasaguluchyadi Kashayam</i>
	<i>Amrithotharam Kashayam</i>
<i>Kashaya yoga</i>	<i>Punarnavadi kashayam</i>
	<i>Rasnerandadi kashayam</i>
	<i>Guluchyadi kashayam</i>
	<i>Sahacharadi kashayam</i>
<i>Gudika yoga</i>	<i>Kaishora guggulu tab</i>
	<i>Sariba ghana vati</i>
<i>Leha yoga</i>	<i>Sooranavaleha</i>
<i>Arishta & Asava yoga</i>	<i>Amritharishtam</i>
	<i>Saribadyasavam</i>
<i>Lepa yoga</i>	<i>Grihadhoomadi lepa churna</i>
	<i>Jadamayadi lepa churnam</i>
	<i>Sahacharadi tailam</i>
	<i>Pinda tailam</i>
<i>Taila yoga</i>	<i>Tila tailam</i>
	<i>Madhuyashtyadi tailm</i>
	<i>Dhanwantaram tailam</i>

Yoga and physical exercises

Various *asanas* (postures) like *Sarvangasana*, *Halasana* and *Pavanamuktasana* and exercises like walking, cycling, swimming, elevation of legs using pillows, or any other properties are useful in *Sirgranthi*.

Use of stockings or bandages

It prevents dilatation of veins and ulcer formation thereby promoting healthy blood circulation. It reduces swelling and inflammation, provides support for activities and helps to reduce the progression of symptoms.

Dietary modifications

Foods that are rich in antioxidants and anti-inflammatory properties, High fiber-rich foods that prevent constipation and avoidance of salty, fatty and processed foods are advised in varicose veins.

Rakthamoksha (Blood-letting) in varicose vein

According to Acharya Susruta, *Rakthamoksha* (blood-letting) is the best procedure for alleviating *thridoshas*. It is one of the 5 basic techniques of detoxification. The imbalanced *doshas* are drawn out from the *Sakhas* (peripheral parts of the body) through an artificial route, facilitating the careful and controlled removal of a substantial amount of blood. Generally used *Rakthamoksha* procedures for *Sirgranthi* are *Siravedha* (venesection) and *Jaloukavacharana* (Leech therapy). These are considered parasurgical procedures through which vitiated blood is eliminated from the body. According to Acharya Susruta, *Siravedha* is *sastrakrita* (using sharp instruments) while *Jaloukavacharana* is an *asasthrakrita* (not using sharp instruments) type of treatment.

Signs of proper *Rakthamoksha* (Blood-letting)¹²

Vedana santi (Pain relief), *Laghuta* (Lightness), *Vyadhirvega prasamana* (Relief of disease symptoms), *Mana prasdana* (Mental happiness).

1. *Siravedha* (venesection)

Siravedha is a valuable and effective method of *Sastrakrut Raktamokshana*. The importance of *Siravedha* can be driven by the fact that it is considered the *Artha chikitsa* in *Salyatantra*. The procedure is economical and safe. Hospitalization is not required, as the procedure can be performed at the OPD level. Since the *doshas* are eliminated directly from the *Shakhas*, there is no need to bring them to the *Koshta*. It relieves the obstruction, causes *Vatanulomana* and relieves pain and stiffness.

Poorvakarma (Preparatory Steps):

It involves the preparation of the patient, equipment, medicines and dressing materials.

Pradhana Karma (Main Steps):

- Positioning: The patient is positioned sitting or standing for proper blood flow.
- Site Selection: Choosing a prominent and engorged vein (*sira*). It is made more visible by methods like tying above the site or pressing with fingers.
- Instruments: Historically, sharp instruments were used; now, a simple needle or scalp vein set is commonly used.
- Blood Quantity: Bloodletting amount varies based on the individual's condition, generally 640ml (1 *prastha*) for healthy individuals, with lesser amounts for weaker patients.

Paschatkarma (Postoperative Care):

- After obtaining signs of proper bloodletting, apply hemostatic and antiseptic powders, followed by a tight bandage on the bloodletting site.

Siravedha effectively addresses *dushta rakta* (vitiated blood) and promotes overall health by reducing pain, balancing *doshas* and improving circulation. It helps to reduce venous congestion, improve circulation and thereby reducing the symptoms in varicose vein.

2. *Jaloukavacharana* (Leech therapy)

In Ayurveda, *Jaloukavacharana* or Leech therapy is an effective treatment for varicose vein. It is also known as Hirudo-therapy. The therapy aimed to improve blood circulation, reduce inflammation and promote healing of damaged tissues in *Sirgranthi*. The use of leeches is the most delicate method of bloodletting, recommended for kings, wealthy individuals, children, the elderly, women and those with delicate health.¹³

The whole procedure is completed in 3 stages

Purvakarma (Preparatory Steps):

It involves,

- Collection of Leeches: Leeches should be collected from clean ponds or lakes, preferably during the autumn (*Sharat Ritu*) when the water is detoxified.
- Selection of Leeches: Ideal leeches are bulky, gluttonous, fast bloodsuckers and non-poisonous. They should be fresh-water varieties.¹⁴
- Storage: Leeches should be stored in large containers with clean water from their natural habitat. They are not fed to enhance their bloodsucking ability and water is changed weekly.¹⁵
- Purification: Leeches are purified by applying a mustard and turmeric paste to activate them before use.¹⁶

Pradhana Karma (Main Procedure):

- Preparation of the Patient: The patient's site should be cleaned and pre-treatment investigations (e.g., hemoglobin, bleeding time) should be conducted to rule out coagulation disorders.
- Application of Leeches: The patient is positioned comfortably and leeches are applied to the affected area. If the leech refuses to stick, a small prick may be made. Once the leech starts sucking, it should be covered with wet gauze and cooled with cold water.
- Leech Removal: Once the leech starts sucking pure blood (indicated by itching or pricking pain), it should be removed. If it doesn't withdraw, a little turmeric or salt is sprinkled on the leech.¹⁷

Paschat Karma (Post-procedure Care):

- Site Cleaning: The site is cleaned with normal saline and turmeric powder is applied to stop bleeding.
- Leech Vomiting: After leeches detach, they should be induced to vomit by applying turmeric powder to their mouths¹⁸
- Storage and Hygiene: Used leeches are stored separately with patient details to avoid cross-infection. A particular leech should be reserved for each patient.

Jalauka (leech therapy) purifies the body by removing toxins and balancing vitiated doshas. In varicose veins (*Siragranthi*), *Vata* and *Pitta dosha* imbalances cause blood stagnation and obstruction in the vessels. The saliva of the leech contains an anticoagulating agent 'Hirudin' which prevents the clotting of blood in veins. This process clears blockages, improves circulation and restores proper blood flow.

Research works on the principles behind the Ayurvedic management of Varicose Vein

In a study by Gloria B. Joseph¹⁹ titled "Revalidation of the Concept of *Sudha* and *Asudha Raktha* through an Interventional Study on Blood Chemistry in Varicose Veins," it was found *Siravedha* has a positive effect on blood chemistry and hemodynamics in varicose veins. Most of the hematological parameters in varicose veins along with oxygen saturation improved after the intervention of *Siravedha*.

In another study by Kartha J. R. et al.²⁰ titled "Effect of *Siravedha* in Varicose Vein - An Exploratory Data Analysis and Modelling," a mathematical model was developed to predict the outcomes of *Siravedha* treatment for varicose veins, utilizing data on clinical staging and blood profiles. The study revealed that this model offers a more comprehensive understanding and clearer insights into the effects of *Siravedha* on both qualitative and quantitative parameters.

The above-mentioned studies highlight the positive impact of *Siravedha* on varicose veins, improving hematological parameters and oxygen saturation. The mathematical model developed by Kartha et al. provides deeper insights into the treatment's effects, enhancing both qualitative and quantitative understanding. These findings emphasize the value of systems biology and network physiology approaches, which offer a comprehensive view of how treatments interact with the body's interconnected systems. This approach could lead to more personalized and effective therapies in the management of varicose veins.

Discussion

Diagnosis, assessment and management of the clinical condition, varicose vein, have many coincidences between Ayurveda and Modern Medicine in many areas. Beyond these, there are links demanding the consideration of Ayurveda Biology in all dimensions owing to the strong interconnections in the conceptualizations in both systems. By exploring the roots, one can identify many hidden truths. While denying the ancient concepts of 'three humors' to proceed to the so-called modern medicine, there was a missing link in favor of treatments like 'blood-letting' which were not at all acceptable from the perspective of ancient science with limited knowledge and resources, undoubtedly proving that none of the three humors can be removed through blood-letting, if they exist at all. But, probing beyond what is seen in the physical form of blood lost, there are new possibilities unearthed considering the Systems Biology and Network Physiology approaches, decisively making blood-letting a rational treatment to bring back the hemodynamic of relatively stagnant blood.

Principles of Ayurveda Biology can be applied at different stages of decision making in the assessment and management of varicose vein. Firstly, to understand the status of impairment in the blood (*raktadushti*), various investigations beginning from blood cell distribution width to oxygen saturation can be applied. Secondly, before deciding on the medical or surgical line of treatment to be adopted, a detailed look at the seriousness of symptoms and functional capacity of blood is needed. Thirdly, if medical management is selected, prognosis has to be predicted clearly so that the quality of life of the person is not forfeited.

Fourthly, if Para surgical or combined management is preferred, the selection of techniques to be employed is of paramount importance. The blood-letting techniques ranging from leech therapy to venesection have unique indications and contra-indications based upon their physiological and biochemical impact on the body's hemodynamics. The key factor in deciding the blood-letting method is not the amount of blood to be removed; but the character of pathogenesis (*dosha dushti*) and the immunological and hematological impact of the procedure. *Pracchana* (a peculiar blood-letting techniques using small and adjacent pricks), if done as adjacent linear scratches (as done by many practitioners) will render more amount of blood loss, but will hamper the healing mechanism owing to its thrombotic and scarring effects compared to the usual pricks rendering more healing effect and less immunological burden even though blood loss is minimal.

Conclusion

Varicose vein is a common vascular condition that primarily occurs due to the imbalance of *Vata* and *Pitta doshas* and *Raktha dhatu*, which can significantly affect an individual's quality of life. Ayurvedic management offers a holistic approach to treating this condition by addressing its root causes and providing effective remedies. Conservative measures such as lifestyle modifications, medicinal treatments and dietary adjustments can alleviate symptoms and improve circulation. Additionally, therapeutic interventions like *Siravedha* (bloodletting) and *Jaloukavacharana* (leech therapy) play a vital role in detoxifying the blood, clearing obstructions and restoring balance to the vascular system. By combining these Ayurvedic therapies, individuals can achieve long-term relief and improved vascular health.

The diagnosis and management of varicose veins demonstrate the value of integrating both Ayurvedic and modern medical perspectives. While traditional concepts such as the 'three humors' were historically set aside in favor of contemporary medical frameworks, the application of Systems

Biology and Network Physiology provides a compelling rationale for treatments like blood-letting. These approaches offer a more nuanced understanding of hemodynamic restoration, bridging the gap between ancient wisdom and modern scientific principles, thereby enhancing therapeutic strategies for varicose vein management.

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