

A BRIEF REVIEW ON HERBS USED IN THE TREATMENT OF VARICOSE VEINS

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ABSTRACT

Background: Varicose veins, a common condition characterized by dilated and tortuous veins, predominantly affect the lower limbs, leading to discomfort, pain, and swelling. Conventional treatments such as surgery and sclerotherapy are often invasive and expensive. This has led to a growing interest in herbal treatments, which are cost-effective, non-invasive, and have been used traditionally for circulatory disorders. **Objective:** This review aims to explore and summarize the therapeutic potential of various herbs used in the treatment of varicose veins, focusing on their pharmacological properties, safety, and efficacy. **Methodology:** A comprehensive literature search was conducted using databases such as PubMed, Google Scholar, and Scopus, covering studies from 2000 to 2023. Keywords including "herbs," "varicose veins," "herbal medicine," and "phytotherapy" were used. Clinical trials, case studies, and traditional knowledge were reviewed to gather information on commonly used herbs like horse chestnut (*Aesculus hippocastanum*), butcher's broom (*Ruscus aculeatus*), and gotu kola (*Centella asiatica*). **Results:** The review identified several herbs with promising properties for the treatment of varicose veins. Horse chestnut extract was found to have anti-inflammatory and venotonic effects, reducing leg swelling and pain. Butcher's broom demonstrated vasoconstrictive properties, improving blood circulation and reducing venous insufficiency. Gotu kola was shown to promote collagen synthesis and strengthen vein walls. These herbs, when used in topical or oral formulations, were generally well-tolerated with few side effects. **Conclusion:** Herbs such as horse chestnut, butcher's broom, and gotu kola offer a viable alternative for managing varicose veins, with clinical evidence supporting their efficacy. While herbal remedies can complement conventional treatments, further large-scale clinical trials are necessary to standardize dosages and formulations to ensure safety and effectiveness.

KEYWORDS: Varicose veins, herbs, herbal treatment, phytotherapy, horse chestnut, butcher's broom, gotu kola.

INTRODUCTION

Varicose veins are the most frequently reported medical condition that causes significant morbidity and long-lasting costs for the patient.^[1-3] Varicose veins are convoluted, expanded, and stretched subcutaneous veins of the lower leg and are an easily observable clinical condition. Inadequacy of the valves results in reflux of blood in the veins of the lower leg which is a typical symptom of varicose veins.^[4] Varicose veins are widely seen as medically unimportant and deserving low priority for treatment.^[5] Varicose veins occur in 20 to 25% of adult females and 10 to 15% of men in western countries.^[6-8] Varicose veins disease extends to chronic venous insufficiency (CVI), which is a significant morbidity, and if varicose veins are left untreated, it may lead to serious complications. For example, edema, thrombophlebitis, external hemorrhage, lipodermatosclerosis, dermatitis, skin pigmentation or discoloration, induration, and ulceration.^[9-11] Although the theoretical basis and clinical aspects of the varicose disease are widely discussed in the literature, the role of

different receptors in the development of the disease is still not well understood.^[12] Varicose veins are tortuous, twisted, or lengthened veins. Unless the enlargement is severe, size alone does not indicate abnormality because size can vary depending on ambient temperature and, in women, hormonal factors. In addition, normal superficial veins in a thin person may appear large, whereas varicose veins in an obese person may be hidden.^[13]

TYPES

There are different types of varicose veins, including

- **Saphenous varicose veins** - These veins swell and bulge out from the skin, appearing rope-like and very large.^[14] There is an increase in intimal thickness in varicose veins compared to normal. This increased thickness could be due to increase in collagen content of intima and migration of SMCs from media to intima.^[15] Other intimal changes are folding, invagination, fragmentation and peeling of intimal endothelium with disintegration of

subendothelial connective tissue and internal elastic lamina.^[15-17]

- **Reticular varicose veins**- Reticular veins are a type of vein that are smaller than varicose veins but larger than spider veins.^[18] They can appear on the legs, face, or breast, and are often blue or green in color.^[19] Reticular veins are also known as feeder veins because they can feed blood to spider veins, causing them to grow.^[20]
- **Spider veins [Telangiectasia]** - Spider veins, also known as telangiectasia or thread veins, are small, damaged blood vessels that appear near the skin's surface.^[21] They can look like red, blue, or purple lines that branch out from a central point, resembling a spider's web. Spider veins are usually harmless and can appear anywhere on the body, but they most often develop on the face or legs.^[22] Pregnancy can increase the risk of developing spider veins because it causes the body to produce more red blood cells, and the extra blood can make blood vessels more dilated. Pregnancy also causes the body to produce more estrogen and progesterone, which can also cause blood vessels to dilate.^[21,23]
- **Trunk varicose veins** - Trunk varicose veins are a type of varicose vein that are thick, knobbly, and often long and swollen. They are usually close to the surface of the skin and can be unsightly.^[24]

SYMPTOMS

Symptoms of varicose veins include:

- **Visible veins:** Varicose veins are often dark blue or purple in color and appear twisted, bulging, or swollen.^[25]
- **Pain and discomfort:** Varicose veins can cause aching, heaviness, burning, or throbbing in the legs.^[26]
- **Cramping:** Leg cramps, often at night or when suddenly standing, are a common symptom.^[27]
- **Skin changes:** The skin around varicose veins can appear dry, itchy, or thin.^[27]
- **Swelling:** Varicose veins can cause swelling in the legs, feet, or ankles.^[28]
- **Restless legs:** Varicose veins can cause restless leg symptoms.^[28]

ANATOMY

Venous drainage of the lower extremities is accomplished by a network of superficial veins connected to the deep veins by small perforator veins. Although disease in any of these venous systems may result in varicose veins, symptoms and their severity increase with the number of systems affected.^[29] Through a variety of pathophysiological mechanisms, weakness develops in the vein wall that results in varicosity over time. Varicosities typically form in the greater and lesser saphenous veins but also develop in branch vessels. Obstruction of the iliac veins or inferior vena cava can result in extensive varicose veins.^[30]

RISK FACTORS

Risk factors for varicose veins can be categorized as hormonal, lifestyle, acquired, and inherited. The effect of estrogen on the risk of varicose veins may explain, in part, the increased prevalence among women. Smoking is an important modifiable risk factor for varicose veins and more severe forms of chronic venous disease, including venous ulceration.^[31,32] Post-thrombotic syndrome after deep vein thrombosis (DVT) may result in varicose veins in the absence of primary venous disease.^[33] Some other risk factors for varicose veins include female gender, age, pregnancy, family history, race, occupation, obesity and diet.^[34-37]

PATHOPHYSIOLOGY

Venous hypertension, venous valvular incompetence, structural changes in the vein wall, inflammation, and alterations in shear stress are the major pathophysiological mechanisms resulting in varicose veins. Venous hypertension is caused by reflux attributable to venous valvular incompetence, venous outflow obstruction, or calf-muscle pump failure.^[38] Venous reflux may occur in either or both the superficial or deep venous system and results in venous hypertension below the area of venous valvular incompetence. In patients with perforator vein incompetence, high pressures generated in the deep veins during calf muscle contraction may be directly transmitted to the superficial system. Valvular incompetence may result from deformation, tearing, thinning, and adhesion of the valve leaflets. Structural changes in the vein wall contribute to pathological weakening and resultant dilation.^[39] Overproduction of collagen type I, decreased synthesis of collagen type III, and disruption of the arrangement of smooth muscle cells and elastin fibers have been observed in histological studies of varicose venous segments.^[40] Increased levels of tissue inhibitors of matrix metalloproteinases observed in varicose vein specimens may favor the deposition of extracellular matrix material in the vein wall. Increased levels of transforming growth factor β 1 and fibroblast growth factor β have also been observed in the walls of varicose veins and may contribute to structural degradation. In animal models, the concentration of neutrophils, monocytes, macrophages, and lymphocytes and levels of matrix metalloproteinases increased in venous valves exposed to high pressures for prolonged periods of time.^[41] Over time, the venous valves exposed to high pressures demonstrated adverse remodeling with decreases in leaflet length and thickness. Turbulent flow, reversal of flow, and decreases in shear stress promote inflammatory and prothrombotic changes that may further contribute to loss of structural and functional integrity of the vein wall and valve leaflets.^[42]

EPIDEMIOLOGY

1. Congenital or acquired valvular dysfunction:

- **Congenital valvular dysfunction:** Some people are born with malformations in their leg veins, such as missing valves. This can cause blood to pool in the

veins instead of flowing toward the heart, which can lead to varicose veins. This is congenital valvular dysfunction.^[43]

- **Acquired valvular dysfunction:** Venous incompetence: This can be caused by a blood clot (thrombus) that damages the valve and leaves behind scar tissue.^[44] Abnormalities in the venous endothelium and smooth muscle cells: These can cause the vein wall to dilate, which can lead to valvular incompetence.^[45]
- 2. **Structural weakness of the vein wall:** A "structural weakness of the vein wall" in varicose veins refers to a breakdown in the connective tissue components of the vein wall, primarily a decrease in collagen and elastin fibers, which leads to a loss of elasticity and allows the vein to become dilated and swollen, forming the characteristic bulging appearance of varicose veins; this weakness can be caused by genetic predisposition, increased pressure due to prolonged standing, pregnancy, or obesity, and can be further aggravated by damaged valves within the vein that allow blood to flow backwards.^[46,47,48]
- 3. **Impaired venous tone:** Another possibility is that the dilatation results from inability of the vein to contract adequately as a result of smooth muscle cell or endothelial dysfunction. In support of this theory a number of abnormalities in the contraction and relaxation of varicose vein have been demonstrated compared to normal vein.^[49]
- 4. **Endothelial activation:** Endothelial activation can lead to vasodilation and loss of venous tone in varicose veins.^[50] This activation can be caused by a number of factors, including
 - Blood stasis- Ischemic conditions can trigger the endothelium to release inflammatory mediators and growth factors.^[51]
 - Shear stress- Even small disturbances in shear stress can activate the BMP4/pSMAD5 pathway, which can lead to endothelial to mesenchymal transition (EndMT).^[52]
 - ETS1- ETS1 senses blood flow disturbances and can promote venous remodeling by inducing endothelial dysfunction.^[53]

PREVENTION

Regular exercising: Exercising 15–20 mins a day including jogging/cycling leads to improve blood circulation & strengthen the leg muscle.^[54,55]

Uplift leg regularly: Make use of footrest whenever you are at work and at home use footstool to elevate the legs that help to improve the blood flow.

Use of compression stocking: Wear the stockings all day to slow down the progress of varicose veins, stockings made up of elastic help to prevent the backward flow of blood in the body, and treat varicose veins effectively.

Ideal weight should be maintained: Excessive body weight can put high pressure on the groin & thighs leads to walls weakening in legs and thighs.

High-heels shoes should be avoided: Wearing highheels can restrict blood flow at the ankles & may affect the large veins pumping mechanism in the calves and feet, Lowheeled shoes improve blood circulation and strengthen the muscles.

Consumption of high fiber, low salt diet: Consuming fiber can reduce constipation which contributes to varicose veins and high salt consumption may lead to vein swelling.

Acupressure: Everyday press of the legs for 10–15mins which can only prevent deterioration, avoid massaging on the affected area.

Yoga: Techniques of stretching/relaxation regularly can be beneficial for treating varicose veins.^[56]

Avoid long periods of standing or sitting: If you must stand for a long time, shift your weight from one leg to another every few minutes. Sit down frequently and elevate your legs. Bounce up and down on the tips of the toes several times an hour. Take a walk if you can. Some people use a small stool to prop up first one foot, then the other when standing at work. If you must sit for long periods of time, stand up and move around or take a short walk Every 30 minutes to let the legs pump blood back to the heart. Stop for a brief walk every 30-45 minutes during long car trips.^[57]

Avoid crossing legs: Try not crossing the legs at the knees when sitting. If you can't prop up the feet, set them flat on the floor or cross them at the ankles. Crossing legs at the knees squeezes veins and blocks blood flow.^[58]

HERBAL TREATMENTS

A wide variety of therapeutic plants can be found all over the world. Many weeds in our environment are highly effective medicinal plants that can help with a variety of significant health issues. India has long been known as a great store of natural remedies among ancient cultures.^[59,60] Following are the herbal plants that are used in the treatment of varicose veins.

1. **Butcher's broom:** *Ruscus aculeatus* (butcher's broom) a subshrub of the lily family native to the Mediterranean region. Active ingredients are ruscogenins, with anti-inflammatory and vasoconstrictive effects. Extracts are used internally and externally in Europe for treating varicose veins and hemorrhoids. Clinical trials have confirmed benefits in both symptomatic relief and improved venous blood flow.^[61,62,63]
2. **Horse chestnut:** *Aesculus hippocastanum* (horse chestnut): seeds of the horse chestnut tree were traditionally used to improve hemorrhoids and varicose veins. Horse chestnut seed extract (HCSE) contains escin (a triterpenic saponin), proanthocyanidin A2, and esculin. All three active components are vasoprotective and venotonic—

provide antioxidant effects combined with the ability to inhibit enzymes that destroy venous structures (collagenase, hyaluronidase, beta-glucuronidase, elastase), thus shifting equilibrium between degradation and synthesis of proteoglycans and other venous structures toward net synthesis. HCSE prevents accumulation of leukocytes in varicose vein-affected limbs and their subsequent activation. Ultimate effect of HCSE treatment is prevention of vascular leakage and increasing venous tone.^[62,63]

- Venotonic: substance improving venous tone by increasing contractile potential of elastic fibers in the vein wall. HCSE's venotonic activity is confirmed in the treatment of varicose veins and thrombophlebitis.
- HCSEs standardized for escin are as effective as compression stockings without the nuisance.
- Can be given orally, or escin/cholesterol complex can be applied topically. Topical formula is beneficial in treatment of bruises by decreasing capillary fragility and swelling.^[63]

3. Gotu Kola: Gotu kola, also known as *Centella asiatica*, may help with varicose veins by:

Stimulating collagen and elastin production: Gotu kola contains a chemical called triterpenic fraction of *Centella asiatica* (TTFCA) that helps strengthen the walls and lining of veins by stimulating collagen and elastin production. Improving blood flow: Gotu kola may help improve blood flow in the legs.^[64] Reducing swelling: Gotu kola may help reduce swelling in the legs. Normalizing connective tissue metabolism: Gotu kola may help normalize connective tissue metabolism, which can help improve blood flow and reduce sclerosis.^[65] Gotu kola may be used to treat poor circulation and burns, which can lead to varicose veins.^[66,67]

4. Stone roots: Stone root is a plant in the mint family that has been used for a variety of purposes, including treating hemorrhoids. It's also been used as a diuretic and astringent. Stone root is vaso-contracting, which may be useful for treating varicose veins and also pelvic or rectal congestion.^[68,69]

5. Garlic: Garlic is high in flavonoids and may help treat Varicose veins. It has the ability to promote blood circulation, relax blood vessels and reduce arterial blood pressure. Garlic specifically can reduce inflammation and other symptoms related to varicose veins. It also can break up harmful toxins that exist in blood vessels. Many have used a garlic clove, orange and olive oil mixture as a topic oil to massage the inflamed veins.^[70] The dysfunction of endothelial cells refers to a decrease in NO-mediated vasodilatory responses in endothelial cells in response to different pathological stimuli. The excessive synthesis of Endothelin-1 (ET1) leads to an increase in vasoconstriction and vascular

permeability. This change can lead to the release of pro-inflammatory factors, over-activation of platelets, enhanced oxidation of LDL, and proliferation and migration of vascular smooth muscle cells.^[71,72] Clinical studies have found that allicin (a sulfur-containing compound found in garlic) reduces ET-1 and C-reaction protein (CRP) levels and elevates NO levels, improves endothelial dysfunction, and reduces the incidence of varicose veins.^[73] Allicin may inhibit cardiomyocyte apoptosis and protect vascular endothelial function by suppressing the expression of CaSR and inhibiting the oxidative stress response. This suggests that garlic consumption may reduce oxidative damage to endothelial cells and improve vascular function.^[74]

6. Ginger: Ginger and its bioactive constituents, including [6]-shogaol and [6]-gingerol, could regulate the endothelial dysfunction and NO synthesis, with the mechanisms mainly related to the EC apoptosis, abnormal lipid transport and plaque rupture.^[75,76]

7. White oak: It promotes healing and acts as a mild blood thinner. White oak bark supplements: the chemical compounds in white oak bark are believed to reduce inflammation of the vein walls.^[77]

8. Yarrow: Yarrow strengthens blood circulation and improves blood flow. It is known to dilate the capillaries, which in turn increases circulation. Healthy blood circulation is essential to maintaining the overall health of the body as it ensures that every part of the body receives enough blood and oxygen to function properly. Varicose veins are a common complaint caused by poor circulation – Yarrow is an excellent herb to prevent or treat this uncomfortable condition. It does this by dispersing blood congestion and by toning the walls of the veins with its astringent properties. This also makes it helpful for more serious complaints such as atherosclerosis.^[78]

9. Cinnamon: Cinnamon has the capacity to improve circulation and raise blood flow. Cinnamon may specifically aid in blood artery dilating and widening, facilitating improved blood flow throughout the body. Cinnamon (*Cinnamomum verum*) is a common spice used in cooking and therapeutic purpose. Several bioactive substances found in cinnamon, such as cinnamaldehyde, cinnamic acid, and cinnamate, are thought to have anti-inflammatory, antioxidant, and antiplatelet properties. These substances may aid in enhancing blood flow and reducing inflammation, which may be advantageous for people who suffer from varicose or venous insufficiency. Cinnamon has also been demonstrated to have favourable effects on blood sugar levels, which may be helpful for people

with circulation issues. Cinnamon has the ability to improve circulation and raise blood flow. Cinnamon may specifically aid in blood artery dilating and widening, facilitating improved blood flow throughout the body.^[79]

10. **Comfrey:** It used externally in form of paste or fomentation for wounds, burns, ulcers and in inflammatory skin disorders and also used in inflammation of thrombophlebitis and phlebitis. It decreases the healing time for skin wounds and irritations. Since ancient times, the herb comfrey (*Symphytum officinale*) has been used to treat a number of medical ailments, including varicose veins. Allantoin, rosmarinic acid, and tannins are primarily responsible for its possible medicinal effects. Chemically speaking, allantoin is an anti-inflammatory substance that is also known to accelerate the healing of wounds. It can aid in reducing varicose veins' characteristic symptoms of inflammation and irritation in the veins. The anti-inflammatory properties of rosmarinic acid are another benefit, and it may help shield the veins from oxidative stress. An astringent form of polyphenol known as tannins can aid to lessen edoema and inflammation. Comfrey is often used externally to reduce swelling, pain, and inflammation caused by varicose veins. It can also be used in lotions, ointments, and poultices. To enhance vein health and circulation, it is also administered orally as teas or capsules.^[80]

11. **Red Roots:** It is beneficial for liver problem; it supports the liver and decrease blockage in the flow of blood from the rectal to the portal veins. It also acts as astringent. Red root (*Ceanothus americanus*) is a plant that is commonly used for its therapeutic purpose. Its major component, a flavonoid known as quercetin. Quercetin is antioxidant that has anti-inflammatory and antiplatelet properties. It aids in lowering vein swelling and irritation, which are frequent signs and symptoms of varicose veins. It also helps to improve blood circulation by preventing clots from forming in the veins. Red root is frequently applied topically in the form of creams or ointments to aid with the swelling, discomfort, and inflammation associated with varicose veins. To enhance vein health and circulation, it can also be consumed orally as tea or pills.^[81]

12. **Geranium:** It used as astringent, (styptic), and act as tonifying for (atomic tissue) venous atony. Geranium (*Pelargonium graveolens*) is a plant that is commonly used in traditional medical purpose and aromatherapy. Geraniol, citronellol, and linalool are the major chemical components of geranium oil that are responsible for its distinctive aroma and potential medicinal effects. Antioxidant and anti-inflammatory effects of geraniol have been demonstrated, which could help in reducing vein inflammation and enhancing blood flow. The

antispasmodic effects of citronellol are thought to help veins relax and decrease the visibility of varicose veins. Furthermore, it's thought that geranium oil has astringent characteristics that can help to tighten and tone the veins, lowering swelling and enhancing blood flow.^[82]

13. **Pine Bark:** Pine bark extract contains several active ingredients, including procyanidins, flavonoids, and phenolic acids, that are believed to be responsible for its health benefits. Procyanidins and flavonoids, which are thought to be responsible for its health advantages, including the potential treatment of varicose veins, are found in standardised amounts in Pycnogenol, (branded pine bark extract).^[83] Pycnogenol has been demonstrated to increase nitric oxide synthesis, which helps to relax blood vessels and boost circulation, therefore improving blood flow. Pycnogenol contains potent anti-inflammatory and antioxidant characteristics that may help reduce swelling and inflammation related to varicose veins. This might assist with symptoms like pain, discomfort, and heavy legs. Pycnogenol has been demonstrated to strengthen blood vessel walls, which may help lower the chance of developing varicose veins and enhance the function of already-existing ones. Pycnogenol is a potent antioxidant that can aid in protecting against oxidative stress, a condition that can harm cells and tissues and lead to the development of varicose veins.^[84]

14. **Brahmi:** Brahmi contain vitamin (beta carotene), and various proteins which help to improve blood circulation by stimulating cell growth and by building collagen. Ayurvedic practitioners frequently employ the herb brahmi (*Bacopa monnieri*) for its possible medical benefits, including its capacity to enhance blood flow and fortify blood vessels. Bacosides and saponins are two of Brahmi's active ingredients that may be the cause of its possible effects. Brahmi contains a class of substances known as bacosides, which have been proven to have neuroprotective and antioxidant properties. Additionally, they might be advantageous for enhancing blood circulation and lowering vein irritation. Another class of substances in brahmi known to have anti-inflammatory and antioxidant activities are saponins. It improves circulation and reduces the visibility of varicose veins by strengthening the vein walls and lowering the risk of blood pooling.^[84]

15. **Witch Hazel:** Used in venous laxity (Ligamentous laxity) and also used as an astringent, styptic, for wounds and local inflammations. Witch hazel (*Hamamelis virginiana*) is a traditional herb that is believed to have astringent, anti-inflammatory, and antioxidant properties. Witch hazel contains tannins, flavonoids, and other polyphenols, which are thought to be the active ingredients responsible for

its therapeutic properties. Tannins contain astringent qualities that aid in vein tightening and toning, lowering edoema, and enhancing blood flow. Flavonoids contain anti-inflammatory and antioxidant property that may help prevent free radicals from harming veins and lessen vein

inflammation. Witch hazel is frequently applied topically in the form of lotions, ointments, or astringents to help relieve the swelling, itching, and discomfort associated with varicose veins. Over time, it may also help decrease the visibility of varicose veins.^[85]

1. *Butcher's broom*^[86, 87]

Common Name	Knee holly, Box holly, Jew's myrtle, Pettigree, Sweet broom
Biological sources and Family	<i>Ruscus aculeatus</i> (Liliaceae)
Part used	Root
Mechanism of action	Active ingredients are ruscogenins, with anti-inflammatory and vasoconstrictive effects.
Marker compound	Ruscogenin and Neoruscogenin

2. *Horse Chestnut*^[88, 89]

Common Name	Buckey
Biological sources and Family	<i>Asculus hippocastanum</i> (Hippocastanaceae)
Part used	Ripe chestnut and bark
Mechanism of action	Provide antioxidant effects combined with the ability to inhibit enzymes that destroy venous structures (collagenase, hyaluronidase, beta-glucuronidase, elastase), thus shifting equilibrium between degradation and synthesis of proteoglycans and other venous structures toward net synthesis. HCSE prevents accumulation of leukocytes in varicose vein-affected limbs and their subsequent activation.
Marker compound	Aescin

3. *Gotu Kola*^[90, 91]

Common Name	Indian pennywort
Biological sources and Family	<i>Centella asiatica</i> (Umbelliferae)
Part used	Whole plant
Mechanism of action	Gotu kola contains a chemical called triterpenic fraction of <i>Centella asiatica</i> (TTFCA) that helps strengthen the walls and lining of veins by stimulating collagen and elastin production.
Marker compound	triterpenic fraction of <i>Centella asiatica</i> (TTFCA)

4. *Stone Roots*.^[92]

Common Name	Richweed, Horsebalm
Biological sources and Family	<i>Collinsonia canadensis</i> (Lamiaceae)
Part used	Roots
Mechanism of action	Stone root is vaso-contracting, which may be useful for treating varicose veins and also pelvic or rectal congestion.
Marker compound	Diosmin, Daflon, Pycnogenol

5. *Garlic*^[93, 94]

Common Name	Lasun
Biological sources and Family	<i>Allium sativum</i> (Amaryllidaceae)
Part used	Flower bulb
Mechanism of action	Allicin (a sulfur-containing compound found in garlic) may inhibit cardiomyocyte apoptosis and protect vascular endothelial function by suppressing the expression of CaSR and inhibiting the oxidative stress response.
Marker compound	Allicin

6. *Ginger*^[95, 96]

Common Name	adrak
Biological sources and Family	<i>Zingiber officinale</i> (family <i>Zingiberaceae</i>)
Part used	rhizome (underground stem)
Mechanism of action	EC apoptosis, abnormal lipid transport and plaque rupture.
Marker compound	[6]-shogaol and [6]-gingerol

7. *White oak*^[97]

Common Name	Stave oak
Biological sources and Family	<i>Quercus alba</i> (<i>Fagaceae</i>)
Part used	Bark
Mechanism of action	The chemical compounds in white oak bark are believed to reduce inflammation of the vein walls.
Marker compound	Tannins, flavonoids, and other polyphenols

8. *Yarrow*^[98, 99]

Common Name	Milfoil
Biological sources and Family	<i>Achillea millefolium</i> (<i>Asteraceae</i>)
Part used	Flowers and leaves
Mechanism of action	Yarrow strengthens blood circulation and improves blood flow. It is known to dilate the capillaries, which in turn increases circulation.
Marker compound	Sabinene, pinene, 1,8-cineole, borneol, β -caryophyllene, and germacrene

9. *Cinnamon*^[100,101]

Common Name	Dalchini
Biological sources and Family	<i>Cinnamomum zeylanicum</i> (<i>Lauraceae</i>)
Part used	Inner bark
Mechanism of action	Cinnamon has the capacity to improve circulation and raise blood flow. Cinnamon may specifically aid in blood artery dilating and widening, facilitating improved blood flow throughout the body.
Marker compound	Cinnamaldehyde, cinnamate, cinnamic acid

10. *Comfrey*^[102,103]

Common Name	Boneset
Biological sources and Family	<i>Symphytum officinalis</i> (<i>Boraginaceae</i>)
Part used	Root and main rib of leaves
Mechanism of action	Allantoin (chemical compound) is an anti-inflammatory substance that is also known to accelerate the healing of wounds. It can aid in reducing varicose veins' characteristic symptoms of inflammation and irritation in the veins.
Marker compound	Lycopsamine, intermedine, 7-acetyllycopsamine, 7-acetylintermedine, and symphytine.

11. *Red root*^[104]

Common Name	New Jersey tea
Biological sources and Family	<i>Ceanothus americanus</i> (<i>Rhamnaceae</i>)
Part used	Root
Mechanism of action	It aids in lowering vein swelling and irritation, which are frequent signs and symptoms of varicose veins. It also helps to improve blood circulation by preventing clots from forming in the veins.
Marker compound	Quercetin

12. Geranium^[105]

Common Name	cranesbill
Biological sources and Family	<i>Geranium maculatum (Geraniaceae)</i>
Part used	Root
Mechanism of action	Antioxidant and anti-inflammatory effects of geraniol have been demonstrated, which could help in reducing vein inflammation and enhancing blood flow. The antispasmodic effects of citronellol are thought to help veins relax and decrease the visibility of varicose veins.
Marker compound	Geraniol, citronellol, and linalool

13. Pine Bark^[106]

Common Name	Cluster pine
Biological sources and Family	<i>Pinus pinaster (Pinaceae family)</i>
Part used	Bark
Mechanism of action	Pycnogenol (branded pine bark extract) has been demonstrated to strengthen blood vessel walls, which may help lower the chance of developing varicose veins and enhance the function of already-existing ones. Pycnogenol is a potent antioxidant that can aid in protecting against oxidative stress, a condition that can harm cells and tissues and lead to the development of varicose veins.
Marker compound	Pycnogenol

14. Brahmi^[107]

Common Name	Bacopa monnieri
Biological sources and Family	<i>Plantago ovata (Plantaginaceae)</i>
Part used	Seed
Mechanism of action	It improves circulation and reduces the visibility of varicose veins by strengthening the vein walls and lowering the risk of blood pooling.
Marker compound	Beta carotene, bacosides

15. Witch Hazel^[108]

Common Name	Winterbloom
Biological sources and Family	<i>Hamamelis virginiana (Hamamelidaceae)</i>
Part used	Bark
Mechanism of action	Witch hazel contains tannins, flavonoids, and other polyphenols, which are thought to be the active ingredients responsible for its therapeutic properties. Tannins contain astringent qualities that aid in vein tightening and toning, lowering edoema, and enhancing blood flow. Flavonoids contain anti-inflammatory and antioxidant property that may help prevent free radicals from harming veins and lessen vein inflammation.
Marker compound	Gallotannins procyanidins, catechins, and flavenols

THERAPEUTIC APPROACH

• **Diet:** rich in dietary fiber; liberal amounts of proanthocyanidin and anthocyanidin-rich berries; garlic, onions, ginger and cayenne liberally.

• **Botanical medicines:** — A. hippocastanum: bark of root, 500 mg t.i.d.
— Escin: 50 mg t.i.d.; alternatively an escin preparation may be applied topically in a 1% concentration.
— *C. asiatica* extract (70% triterpenic acid content): 30 mg t.i.d.
— *R. aculeatus* extract (9% to 11% ruscogenin content):

100 mg t.i.d.

— Grapeseed (*Vitis vinifera*) extract (95% procyanidolic oligomers): 150 to 300 mg /day.

— Pine bark extract (*Pinus pinaster*): 150 to 300 mg/day.

— Micronized diosmin: 500 to 1000 mg/day.

— Hydroxy-ethylrutosides: 1000 to 3000 mg/day.

• **Useful adjunct:** — Bromelain (minimum 1500 milk clotting units [MCU]): 500 to 750 mg t.i.d. between meals.^[109]

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