ISSN: 2347-6567

International Journal of Allied Medical Sciences and Clinical Research (IJAMSCR)

IJAMSCR | Vol.14 | Issue 1| Jan - Mar - 2026

www.ijamscr.com

DOI : https://doi.org/10.61096/ijamscr.v14.iss1.2026.73-87

Phytochemical Based Therapies for Varicose Veins: Mechanisms and Their Therapeutic Potential

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Published by: 10.02.2026

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Abstract: Varicose veins are a common manifestation of chronic venous disease (CVD), characterized by dilated, tortuous veins resulting from venous valve dysfunction, venous hypertension, and impaired blood flow. The condition is associated with symptoms such as pain, swelling, heaviness, skin changes, and in severe cases, ulceration and thrombosis. Conventional treatments often provide limited relief and may involve invasive procedures. As a result, growing attention has been directed toward plant-based therapies rich in bioactive phytochemicals. This review highlights the role of phytochemicals—particularly flavonoids, saponins, terpenoids, and polyphenols—in the management of varicose veins. Medicinal plants such as Centella asiatica (Gotu kola) and Terminalia arjuna (Arjuna) demonstrate venotonic, anti-inflammatory, antioxidant, and microcirculatory-enhancing properties. These natural compounds act by strengthening venous walls, reducing capillary permeability, improving blood rheology, and inhibiting inflammatory mediators. The integration of phytochemicals into varicose vein management offers a promising, safer, and supportive approach for improving venous health and alleviating symptoms of chronic venous insufficiency.

Keyword: Varicose veins; Chronic venous disease; Phytochemicals; Natural therapy; Flavonoids; Microcirculation; Herbal medicine.

INTRODUCTION:

Chronic venous disease (CVD) is defined as "(Any) morphological and functional abnormalities of the venous system of long duration manifested either by symptoms and/or signs indicating the need for investigation and/or care." Any vein in the human body can be affected by CVD, but the veins in the lower extremities are particularly vulnerable because they must overcome gravitational pressure, which is higher than in other parts of the body [1].

Varicose veins are enlarged, twisted veins that develop just beneath the skin's surface. They happen when the veins' blood-flow-regulating valves weaken or break, allowing blood to collect in a region and the veins to expand**.** Pain, swelling, heaviness, discomfort, and in certain situations, more serious problems such skin ulcers or blood clots can develop from this disorders [2] [3]. Each of these veins has one-way valves to guarantee that blood goes to the heart; nevertheless, these valves are typically ineffective, causing blood reflux and venous hypertension, which can result in symptoms. This venous disorder is caused due to prolonged standing, childbirth, obesity, old age and athletes [4]. In the purpose of overcome from this, the Indian medicinal system provide the

natural treatments in the different principle. 10–20% of people worldwide are affected, with 5% of those people living in India [5].

Phlebotomies is a broad category that includes medications intended to treat chronic venous illness [6]. Subsequently, the classification was split into two groups: venoactives, which lower capillary permeability and pro-inflammatory mediator release, and non-venoactives, which lower platelet aggregation and leukocyte activity. Increasing venous tone and decreasing capillary permeability and fragility are the two primary pathophysiological goals of treatment. Reducing microcirculatory issues, correcting hem rheological aberrations, 9 improving parietal fibrinolytic activity, and slowing the progression of venous ulcers are other goals that might be added to the list [7, 8]. Numerous phytochemical classes found in natural sources may be utilized to treat chronic venous illness. Purified and micronized flavonoid fractions (MPFF), which have the greatest level of evidence (level A) and are included in the therapeutic guideline under the recommendation class, are the primary pharmacological treatment. They showed cumulative efficacy on a number of pathological aspects, including increased capillary resistance, venotonic action (which inhibits noradrenaline metabolism), antioxidant and anti-inflammatory action, a protective effect against valvar damage caused by inflammatory factors (which delays venous reflux), and inhibition of leukocyte activation, migration, and adhesion[7,8,6,9,10,11,12]. The vegetable product Sophorae flos is well-known for containing terpenes including sophoradiol, betulinol, soyasaponin, and phase side as well as flavonoids such rutin, isoquercetin, kaempferol, isorhamnetol, genistein, and pratensin. It contains flavonoids, including rutin. Its anti-inflammatory, antioxidant, anticancer, and antibacterial properties are determined by its chemical makeup. Its anti-inflammatory (inhibition of the p38 MAPK signaling pathway, inhibition of leukocyte infiltrates, decrease in NF-kB activation, inhibition of matrix-metalloproteinases), antioxidant (quenching hydroxyl and superoxide free radicals, chelation of metal ions, increase of SOD activity), and antiplatelet effect (inhibition of aggregation induced by TXA2 pathway, decreasing Ca2+ free at the platelet level). [13, 14, 15, 16].

Aim

To assess phytochemicals' potential for managing and treating varicose veins.

To comprehend how they work to enhance microcirculation, lower inflammation, and improve venous tone. To draw attention to medicinal plants that have been shown to have therapeutic potential as supportive, safer substitutes for traditional therapy.

CAUSES OF VENOUS STASIS:

It is now understood that the development of venous stasis and the persistence of elevated pressure are primarily caused by morphological alterations in veins. It is challenging to empty when standing because to the major vein walls' widening and irregularity. Put another way, stasis is caused by the growth of varicose veins. These anatomical alterations are also significantly influenced by aggravating circumstances.

- Functional abnormalities
- Hem rheological abnormalities

Functional abnormalities: a very late-onset lower calf ejection fraction (measured by plethysmography) is a highly aggravating factor associated with muscle pump failure, particularly during bed rest. Furthermore, a major contributing factor to the worsening is valve reflux (detected by Doppler), which can occur early, even before valvular incompetence, or late, depending on the individual, at different venous system sites of stasis. Reflux is prevalent; 68% of individuals have it in the saphenous below the knee, 55% above, and 30% at the saphenofemoral junction. Patients with ulcers experience severe, multi segmental reflux. When edema is present, reflux is both deep and superficial.

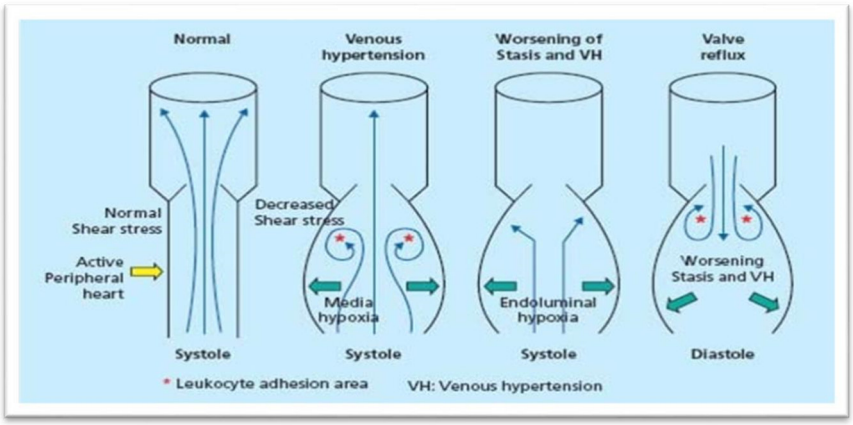
Hem rheological abnormalities: CVI, the systemic circulation, and varicose blood arteries all exhibit elevated blood viscosity and red cell aggregation. These occurrences are associated with blood levels of big molecules, particularly fibrinogen. This is a common characteristic of CVI. As a result, venous wall morphological changes, the start of reflux, and rheological abnormalities all increase with age, familial genetic conditions, pregnancy, and prolonged standing [17].

MECHANISM OFACTINO OF VARICOSE VEINS:

Two mechanisms, shear stress abnormality and hypoxia, induce transformation and thickening of the venous wall, being responsible for biochemical changes in this structure.

Abnormalities of blood flow shear stress at the wall:

- When standing, venous return flow easily loses its homogeneity. Because of pulsations which flatten then open lower limb veins, it is frequently turbulent or pulsatile, and endothelial surfaces in particular become less affected by shear stress (5 to 10 dynes/cm2 as opposed to 20 to 30).
- This hinders mechano-transduction; the endothelium becomes activated, opens ionic channels, produces less nitric oxide (NO), and produces more endothelin 1 (ET1) and plasminogen activator inhibitor (PAI-1).
- The endothelium in these areas expresses adhesion molecules and generates growth factors and cytokines. Sub endothelial leukocyte transit is caused by areas of delayed leukocyte circulation, particularly in sub valvular regions.
- The wall is subsequently supplied with growth factors and enzymes by macrophage monocytes and mast cells, creating the biochemical foundation of varicose veins [18]. **Venous wall hypoxia**
- In example, endothelial surfaces become less impacted by shear stress (5 to 10 dynes/cm2 as opposed to 20 to 30), and it is often turbulent or pulsatile.
- The endothelium gets active, opens ionic channels, produces less nitric oxide (NO), and produces more endothelin 1 (ET1) and plasminogen activator inhibitor (PAI-1), all of which impede mechano-transduction.
- These regions' endothelium produces cytokines, growth factors, and adhesion molecules. Areas of delayed leukocyte circulation, especially in subvalvular regions, are the cause of sub endothelial leukocyte transit.
- The biochemical basis of varicose veins is then created by macrophage monocytes and mast cells supplying the wall with growth factors and enzymes**. [19].**



CURRENT STATUS:

Currently, therapeutic guidelines for the treatment of chronic venous insufficiency include micronized purified flavonoid fraction (MPFF). Experimental and clinical research supports medicinal herbs such as Centella asiatica, Terminalia arjuna, horse chestnut, butcher's broom, and turmeric. Phytochemical formulations are frequently employed as topical gels, dietary supplements, and supportive treatments. However, their widespread acceptability in mainstream medicine is constrained by a lack of standardization, extensive clinical trials, and regulatory conformity.

DIFFERNCE BETWEEEN NORMAL VEIN AND VARICOSE VEIN [19]

Normal, healthy veins and varicose veins differ significantly. Although varicose veins may indicate health issues, it is a common misconception that they merely indicate an aesthetic issue. Blood is transported throughout the body via the complex network of vessels known as the cardiovascular system. All bodily tissues receive blood from it, enabling them to perform at their best. Additionally, it helps the body get rid of waste.

Tiny valves within the veins force blood back to the heart when your venous system is functioning properly. Blood cannot return to the heart when these valves are weak or broken. Rather, it backs up and starts to build up in the veins. The veins become varicose veins when they malfunction.

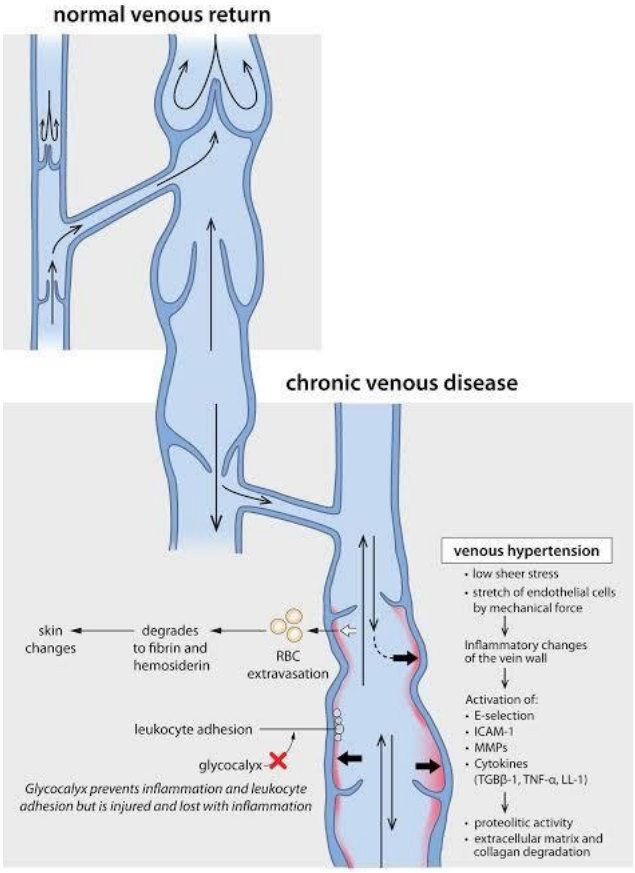


Fig: 2 difference between normal vein and varicose vein.

Varicose veins are caused by a number of reasons, such as:

- Genetics: The chance of getting varicose veins is increased if there is a family history of the condition.
- Age: As people get older, their veins become less flexible and their valves may become weaker.
- Gender: Due in part to hormonal changes during pregnancy, premenstruation, and menopause, women are more likely to develop varicose veins.
- Pregnancy: Enlarged veins may result from increased blood volume and hormonal changes during pregnancy.
- Obesity: Being overweight puts more strain on the veins.

PROLONGED SITTING OR STANDING

About half of all people have varicose veins at some point in their lives. Studies show that up to 55% of women and 45% of men have some kind of

vein problem, making them especially common among women. Varicose veins are more common in people over 50, and the chance of acquiring them rises with age. Another major risk factor is pregnancy, as many women develop varicose veins both during and after their pregnancies.

NATURAL TREATMENT FOR VARICOSE VEINS:

DEFINITION: Therapy for a disorder that damages veins close to the skin's surface.

PRINCIPAL PROPOSED NATURAL TREATMENTS: Butcher's broom, gotu kola, horse chestnut, oligomeric proanthocyanidins, oxer tins and other bioflavonoids, red vine leaf (grape leaf)

Additional natural remedies that are suggested include balneotherapy, bromelain, calendula, Collinsonia, comfrey, mesoglycan, Mimosa tenuiflora, and witch hazel [20].

Natural products work better for some diseases than for others. Even with contemporary medicine, venous insufficiency and varicose veins are notoriously difficult to cure, despite the fact that many therapies have significant supporting data. In general, these therapies work by thickening the walls of veins and other vessels, with the overall consequence of minimizing fluid leakage [21]. There is no solid proof that any natural product can treat varicose veins or stop them from growing, however studies show that some products can lessen leg pain and swelling. Dangerous illnesses like phlebitis or thrombosis can generate symptoms that resemble those of varicose veins. One should see a doctor before self-treating with the natural substances listed here [22].

Overview People have traditionally employed plant-based medicines to heal a wide range of physical and mental illnesses. They are used in traditional medicine by many cultures worldwide. Because they can be used in the culinary, pharmaceutical, and cosmetic industries, medicinal and aromatic plants, or MAPs, are becoming more and more significant. The usage of MAP sin everyday life underscores the necessity for future multidisciplinary research studies to provide scientific evidence of their benefits [23].

The world population's increased life expectancy in recent years has caused a shift in demography, particularly in wealthy nations, from youthful to hyper-aging cultures. In 2015, 901 million people, or 12.5% of the global population, were 60 years of age or older (World Population Aging Study, United Nations, 2015). Health and well-being, as well as economic and societal goals, may be impacted by this shift. [24].

THE BRIEF ACCOUNT ON THE MEDICINAL PLANT IN THE TREATMENT OF VARICOSE VEINS:

Centella asiatica

Commonly known as mandukparni or Indian pennywort or jalbrahmi, it has been used as a medicine in the Ayurvedic tradition of India for thousands of years and listed in the famous 'Sushruta Samhita', an old Indian medical text [25, 26]. The herb is also used by the natives of Java and other Indonesian islands. In China, known as gotu kola, it is one of the reported "miracle elixirs of life" discovered over 2000 years ago [26]. Since it doesn't contain caffeine and hasn't been demonstrated to have stimulant qualities, CA or gotukola should not be confused with kola nuts. In addition to wound healing, CA and its extracts were included to the Indian pharmacopoeia in the nineteenth century.

It can also recommended for the treatment of various disorders like leprosy, varicose vein eczema, psoriasis, diarrhoea, amenorrhea, fever, and disease of the female genitourinary tract.

Kingdom: Plantae

Clade: Tracheophytes

Clade: Angiosperms

Clade: Eudicots

Clade: Asteroids

Order: Apiole's

Family: Apiaceous

Genus: Centella

Species: C. asiatica

DESCRIPTION OF *CENTELA ASIATICA*:

Centella asiatica (CA), a clonal, perennial herbaceous creeper belonging to the **family** Umbelliferon **(Apiceae)** is found across India growing in damp locations up to an altitude of 1800 m. It is found in most tropical and subtropical nations growing in swampy places, including sections of India, Pakistan, Sri Lanka, Madagascar, and South Africa and South pacific and Eastern Europe. The majority of tropical or

wet pantropical regions, including rice fields, as well as rocky, higher elevations, are home to about 20 CA-related species [27]
TASTE: tasteless

ODOUR: odourless plant that thrives in and around water.

SHAPE: little fan-shaped green leaves with white or light purple-to-pink or white blooms and it yields small oval fruit.

The whole plant is utilized for medical purposes [28].

USES: In addition to treating high blood pressure, improving cognition, and extending life, it is frequently used as a blood purifier and in the treatment of varicose veins. In Ayurveda, CA is one of the key herbs for rejuvenating the nerves and brain cells. Eastern healers depended on CA to cure emotional diseases, such as depression, that were supposed to be rooted in physical problems [29,30]. In the Western medicine, throughout the middle of the twentieth century, CA and its alcohol extracts stated to have showed positive effects in the treatment of leprosy [31].

Active ingredients:

The principal active elements of CA are saponins (sometimes termed triterpenoids), which comprise asiaticosides, in which a trisaccharide molecule is connected to the aglycone asiatic acid, madecassoside and madasiatic acid [32]. By preventing the formation of collagen at the wound site, these triterpene saponins and their sapogenins are primarily in charge of the vascular effects and wound healing. Other components extracted from CA, such as brahmoside and brahminoside, may be responsible for CNS and uterorelaxant activities, but are yet to be verified by clinical investigations. Crude extract including glycosides isothankuniside and thankuniside showed antifertility activity in mice [33, 34].

Venous hypertension can be effectively treated with centelloside and its derivatives. Plant sterols, phytosterols (campesterol, sit sterol, stigma sterol), free amino acids (alanine, serine, amino butyrate, aspartate, glutamate, lysine, and threonine), an alkaloid (hydrochotine), a bitter component (vallerine), and fatty acids (linoleic acids, linolnelic, oleic, palmitic, and stearic acids) are also present in the total extract [35].

The therapeutic properties of C. asiatica are attributed to the presence of numerous phytoconstituents such as terpenes, phenols, vitamins, minerals, polyacetylene, and fatty acids. The triterpene saponins and their sapogenin derivatives are responsible for the majority of these bioactivities. The herb is valued in the traditional systems of medicine for the treatment of various chronic disorders such as Alzheimer, varicose veins, duodenal ulcer, psoriasis, leprosy, certain eczemas, hypertonic scar, and keloids. The plant is also renowned for exhibiting powerful anti-inflammatory, anti-asthmatic, anti-oxidative, anti-cancer, hepatoprotective, and neuroprotective effects.

Several active triterpenoids and saponins found in Centella asiatica, such as madecassoside, asiaticoside, centelloside, and asiatic acid, have been shown to promote cellular hyperplasia, collagen synthesis, granulation tissue levels of DNA, protein, total collagen, hexosamine, rapid maturation, and collagen crosslinking [33]. Asiaticoside (21) is another active saponin, which promoted type-I collagen synthesis in human dermal fibroblast cells. Triterpenes including asiatic acid, madecassic acid, and asiaticoside extracted from C. asiatica were screened on human fore skin fibroblast monolayer cultures; it was observed that collagen synthesis was increased in a dose-dependent manner, whereas the specific activity of resynthesized collagen was decreased.



Fig 3: centella asiatica

Venous insufficiency: By fortifying the weak veins, CA was thought to have a major impact on connective tissues [36]. It was suggested that CA might help maintain connective tissue. As it has been found to increase the development of hyaluronidase and

chondroitin sulfate and to have a balancing effect on the connective tissue, it may also help stabilize the growth of connective tissue and reduce its formation in the treatment of scleroderma [37]. According to reports, CA acts on the vascular wall's connective tissues, reducing capillary filtration rate by enhancing microcirculatory parameters and being helpful in venous insufficiency and hypertensive microangiopathy [38].

Gotu kola is POSSIBLY SAFE for most persons when applied to the skin for up to 12 months or when consumed by mouth for up to 8 weeks. Gotu kola may induce nausea and stomach discomfort when consumed orally. Rarely, gotu kola may potentially cause liver problems if taken by mouth. When applied on the skin, gotu kola may produce itching and redness.

APPLICATION

- Treatments based on phytochemicals are used to lessen fatigue, leg pain, edema, and heaviness.
- Enhancing venous elasticity and tone
- Improving lymphatic drainage and microcirculation Stopping the development of chronic venous insufficiency
- Assisting with healing following surgery or an intervention
- Handling edema and venous ulcers these treatments are frequently used in addition to lifestyle changes and compression therapy.

Precautions: Pregnancy and breast-feeding: Gotu kola is POSSIBLY SAFE in pregnant women when administered to the skin. But don't take it by mouth. Not enough is known regarding the safety of eating gotu kola orally. The safety of consuming gotu kola during nursing is also not well understood. Avoid using it if you are nursing [39].

II. *ARJUNA TERMINALIA*

BOTANICAL NAME: Terminalia arjuna

FAMILY: Combretaceae

Morphology

A huge tree with smooth grey bark and a trunk that is frequently buttressed, standing 20 to 25 meters tall.

Leaves—simple, sub opposite, rigid, coriaceous, and oblong to elliptic, 10-20 cm long.

Flowers— yellowish-white, borne in brief panicled-spikes.

Fruits: obovoid-oblong, 2.5–5 cm long, with 5–7 equal, thick, narrow, rigid, coriaceous wings.

Fruits appear from September to November, while flowers appear from March to June. Distribution and Habitat: Throughout India

Chemical components:

Flavones, tannins, oligomeric proanthocyanidins, terminic acid, arjunetin, arjunosides I–IV, and antioxidants



Fig 4: arjuna terminalia Properties

Colour

Outer bark: Pinkish-grey or greyish-brown.

Inner bark: Reddish-brown.

Powdered bark: Light brown.

Flowers: Yellowish-white.

Leaves: Green on top and brown underneath.

Odour

Outer bark: Pungent or astringent.

Flowers: Strong, and sometimes described as offensive.

Other parts: Odourless or have a mild odour.

Names in different Indian languages:

English: Arjun

Hindi: Arjun, kahu, kahua

Kannada: Maddi, vaidairya

Malayalam: Nirmaruthu, venmaruthu, attumaruthu, maruthu, pulamatti Sanskrit: Arjunah, kakubhah

Tamil: Marudam, attumaruttu, nirmaruttu, vellaimaruttu

Telugu: errramaddi

Unani: arjuna

APPLICATIONS OF *TERMINALIA ARJUNA* PLANT:

1. **Strengthens Blood Vessel Walls**: By fortifying blood vessel walls, arjuna promotes vein health. This improves circulation and lowers the chance of varicose veins by preventing veins from weakening or stretching. Arjuna aids in preserving vein flexibility, which is necessary for healthy vein function.
2. **Improves Circulation and Blood Flow**: By widening blood arteries, arjuna facilitates improved blood circulation and more effective blood flow throughout the body. In addition to lowering vein pressure and facilitating smoother blood flow, proper circulation guarantees that organs and tissues receive the oxygen and nutrients they require.
3. **Prevents Blood clot**: Blood clots can lead to catastrophic illnesses such deep vein thrombosis (DVT), strokes, or heart attacks. Arjuna contains Herbal anticoagulant qualities that assist prevent clot formation. By minimizing the chance of clots, Arjuna supports healthy veins and ensures unimpeded blood flow[40].
4. **Reduces Inflammation:** Veins Inflammation in veins, particularly in situations of varicose veins, can cause discomfort and agony. Arjuna's anti-inflammatory qualities calm irritated veins and lessen edema. It helps reduce symptoms such as pain and leg tiredness.
5. **Promotes Cardiovascular Health in General** Arjuna is a great supplement for general cardiovascular wellbeing because it has long been utilized in Ayurveda to promote heart health. By enhancing heart function, Arjuna ensures effective blood circulation via the veins, thus promoting vein health.
6. **Blood vessels: It** contracts the blood vessel and lowers the blood pressure.

HORSE CHESTNUT SEEDS:

Aesculus hippocastanum, or horse chestnut, is a tree. Horse chestnuts can be fatal if consumed uncooked because they contain high concentrations of the toxin esculin.

Additionally, horse chestnut has a blood-thinning ingredient. It can assist avoid water retention (edema) by making it more difficult for fluid to escape from veins and capillaries. The horse chestnut fruits feature seeds that resemble delicious chestnuts but taste harsh insufficiency (CVI), a condition that causes swelling in the legs due to impaired circulation. Horse chestnut seed extracts are most frequently taken orally to treat chronic venous It is also used to treat a wide range of other ailments, although these additional applications lack solid scientific backing.

Aesculus hippocastanum is the scientific name.

Family: Maple family (Sapindaceae).

Large, palmately compound leaves that resemble hands have five to nine serrated leaflets that radiate from a central point and turn yellow or scarlet in the fall.

Flowers: White, in upright, conical clusters (panicles), frequently with red or yellow markings. Fruit: One or two large, smooth, brown seeds (conkers) are visible when the round, spiky green husk cracks.

When young, the bark is smooth and grey; as it ages, it develops scaly plates.

Size: Often used for street and park planting, this large tree is usually 50–75 feet tall and has a wide spread.

Growing Conditions & Habitat:

Origin: Southeast Europe.

Preferences: Full sun to light shade and moist, well-drained soils.



Fig 5: horse chestnut

HORSE CHESTNUT

Aesculus hippocastanum (horse chestnut) should not be confused with Aesculus glabra (Ohio buckeye) or Aesculus californica (California buckeye). Although some refer to any of these plants as horse chestnut, they are distinct plants with varying properties.

Applications & Efficiency: Potentially Useful for,

1. Leg swelling may result from poor circulation (chronic venous insufficiency, or CVI).
2. Some signs of poor blood circulation, including varicose veins, soreness, fatigue, leg swelling, itching, and water retention, can be lessened by taking 300 mg of standardized horse chestnut seed extract orally. However, it may not be as helpful as maritime pine bark for reducing cramping and swelling in the legs.
3. Horse chestnut is being used for a variety of other uses, but there isn't enough solid data to determine whether it could be beneficial.

BUTCHER BROOM:

Ruscus aculeatus, also called butcher's-broom [42], is a low evergreen dioecious Eurasian shrub with flat stems called cladodes that resemble stiff, spine-tipped leaves. In the spring, tiny greenish flowers are borne singly in the cladode center. In addition to the seeds being dispersed by birds and a red berry that follows the female flowers, the plant also spreads vegetatively by rhizomes. It is indigenous to regions of northern Africa and Eurasia. [43] *Ruscus aculeatus* grows on coastal cliffs and in forests and hedgerows, where it can withstand intense shadow. *Ruscus aculeatus* has become a reasonably widespread landscape plant, probably because of its lovely winter/spring color.

Butcher's broom, *or Ruscus aculeatus*, is a Mediterranean evergreen that has long been used to treat a variety of ailments, including venous problems. Its main therapeutic use is in the treatment of chronic venous insufficiency (CVI), a disorder marked by inadequate blood flow that can cause leg pain and swelling. Germany's Commission E has approved the plant as a supportive treatment for CVI, and clinical trials have shown promise with notable decreases in participants' leg edema. Butcher's broom is also recommended for treating lymphedema following breast cancer surgery and for controlling hemorrhoids since it resembles varicose veins.

Kingdom: Plantae

Clade: Tracheophytes

Clade: Angiosperms

Clade: Monocots

Order: Asparaguses

Family: Asparagaceae

Subfamily: Convallarioideae

Genus: Ruscus

Species: R. aculeatus

Although more research is required, there is some evidence that it may also aid with orthostatic hypotension. It is usually advised to consume a strong extract of Butcher's broom twice a day. Due to a lack of thorough safety research, pregnant women and young children should exercise caution even though it is generally thought to be safe with few side effects. All things considered, Butcher's broom is a natural remedy for certain venous disorders, but further investigation is necessary to completely determine its effectiveness and safety in a range of demographics.

Ruscus aculeatus, or butcher's broom, is a little evergreen plant.

It has particularly hardy branches and is indigenous to Western Europe. Its name comes from the fact that butchers used to bundle its branches to sweep clean their chopping blocks. Furthermore, butcher's broom has been utilized for thousands of years in herbal therapy. Because they contain a variety of medicinal chemicals, such as flavonoids and many others, their root and rootstock are highly valued in herbal medicine (41).

These substances could be the reason butcher's broom is associated with a number of possible health advantages, including better blood circulation and the treatment of hemorrhoids.



Fig 6: Ruscus Aculeatus

Steroidal saponins are the main phytochemicals found in butcher's broom.[43] Saponins have the ability to produce foam and are found naturally in plants as glycosides.[44] Ruscogenins, ruscogenen, and neoruscogenin—named for the genus Ruscus—are the particular saponins present in butcher's broom.[45] Ruscogenins are thought to produce vascular constriction in addition to acting as anti-inflammatory agents [46].[47] Although the exact mechanism of action of ruscogenins is still unknown, one theory holds that they inhibit leukocyte migration via regulating both proteins and mRNA.[46] Neoruscogenin has been found to be a strong and highly selective agonist of the nuclear receptor RORα (NR1F1).[48]

Butcher's broom contains polyphenols that may also be physiologically active, possibly as an antioxidant, according to more recent research. [49][50].

Butcher's broom and stimulant medications (alpha-adrenergic agonists) interact

A butcher's broom may raise blood pressure, speed up the heartbeat, and activate the brain. The effects of stimulant drugs are comparable. Combining them with a butcher's broom may cause the heart to beat too quickly or the blood pressure to rise too high. Butcher's Broom interacts with alpha-adrenergic antagonists, which are medications used to treat high blood pressure. Using a butcher's broom could raise blood pressure. Butcher's broom may lessen the effects of blood pressure drugs. Keep a careful eye on your blood pressure.

Could Diminish Inflammation:

Your body uses inflammation as a natural defense against pathogens and self-healing. However, because it raises your risk of certain diseases, chronic inflammation can lead to health issues (2Trusted Source). Ruscogenin, one of the substances found in butcher's broom, may help reduce inflammatory signals and possibly repair inflammation-related damage. Ruscogenin, for example, decreased inflammatory indicators and inhibited the synthesis of an enzyme that causes cartilage degradation in osteoarthritis patients in test-tube experiments (3Trusted Source, 4Trusted Source). Ruscogenin decreased inflammatory indicators linked to diabetes and cured damage brought on by such inflammation, according to an animal study (5Trusted Source).There aren't many human research on butcher's brooms, though. Before definitive conclusions can be made, more research is required.

Potential Treatment for Inadequate Blood Flow:

Conditions affecting blood circulation may be treated using a butcher's broom.

For instance, it might help treat chronic venous insufficiency (CVI), a painful condition where the veins in your legs have trouble returning blood to your heart.

Butcher's broom has a number of chemicals that aid in vein contraction, which enables blood to return to the heart (7Trusted Source).

In fact, studies show that using a butcher's broom considerably lessens swelling and tension in the lower legs and ankles of adults with CVI (8Trusted Source).

Furthermore, a butcher's broom supplement dramatically decreased discomfort, cramping, and swelling in persons with CVI, according to an analysis of 20 research.

Could Lower Your Hemorrhoid Risk:

Hemorrhoids are a prevalent health issue, particularly in the elderly.

Many people use natural products, including butcher's brooms, to prevent hemorrhoids.

Because it seems to lessen edema and aid in vein contraction, butcher's broom is used in alternative medicine to treat hemorrhoids and other vascular disorders (12Trusted Source).

In one study, 69% of participants who took a butcher's broom supplement thought it was

a successful hemorrhoid therapy that lessened discomfort, edema, and other symptoms.

Dosage Suggestions;

As of right now, there is no official suggested dosage for butcher's broom. Nonetheless, research suggests that the following dosages work best:

1. 1.5–3 grams of dried root daily
2. 200 mg of a 4:1 concentration in tablets or capsules Two or three times a day
3. Tinctures and liquid extracts: 7.5–15 ml daily of a 1:5 herb-to-liquid ratio tincture or 3–6 ml daily of a 1:2 herb-to-liquid ratio liquid extract

Supplements containing butcher's broom, hesperidin methyl chalcone, and ascorbic acid are used in many scientific investigations on the subject.

TUMERIC IN THE TREATMENT OF VARICOSE VEIN

Turmeric, or *Curcuma longa*, is a tropical perennial herb that belongs to the ginger family (Zingiberaceae) and is native to South Asia. It grows from thick underground stems (rhizomes) with large, oblong leaves and pale yellow flowers. It thrives in warm, rainy climates and is usually propagated by its rhizomes.

Botanical Features

Family: Ginger Family (Zingiberaceae)

Type: Herbaceous, rhizomatous, perennial plant

Height: Reaches a maximum of one meter (3–4 feet). tall

Large, oblong-lanceolate (spear-shaped) leaves, grouped in two rows on a "false stem" (pseudo stem), are dark green above and pale green below.

Rhizome: The part used for spice; thick, meaty, branched underground stems (tubers) with orange flesh and skin. blooms: Often greenish in color, small, pale yellow blooms are arranged in thick spikes**.**

Turmeric's Anti-Inflammatory Properties

Turmeric's capacity to lower inflammation is one of its main advantages over other substances. Numerous conditions, including varicosities, have been linked to chronic inflammation. It is crucial for controlling its symptoms by lowering inflammations because this weakens the vein walls, which may result in the development or exacerbation of varicosities themselves.

Turmeric's Antioxidant Benefits

Furthermore, turmeric is rich in antioxidants that help shield cells from damage brought on by free radicals, which are unstable molecules. They are also associated with long-term illnesses. Turmeric improves overall vascular health and may lower the risk of varicose veins by combating these free radicals.

Blood Circulation and Turmeric

In order to prevent and treat varicose veins, good blood circulation is crucial. According to research, turmeric increases blood flow and decreases blood clotting. Better circulation can help lessen the buildup of blood in the veins and relieve symptoms, which can be especially helpful for people with varicose veins.

To Treat Varicose Veins with Turmeric

Here are some methods to incorporate turmeric into your everyday routine to potentially help alleviate varicosities:

Turmeric Supplements Tablets or capsules: These offer a simple method to guarantee that you get a regular amount of turmeric.

Curcumin Extracts: Because they contain extremely high concentrations of curcumin, its effects are amplified.



OTHER PURPOSED TREATMENT FOR VARICOSE VEINS:

The effectiveness of a well-liked European remedy that combines butcher's broom extract with the bioflavonoid hesperidin methyl chalcone and vitamin C has been assessed in numerous double-blind, placebo-controlled experiments. This combined treatment seems to

be more successful than a placebo, despite the fact that not all studies were favorable and several had design faults.

Mesoglycan, a material derived from pig intestines, has been studied in Italy as a treatment for varicose veins and associated disorders. 183 patients with leg ulcers brought on by impaired venous function were given either a placebo or mesoglycan (first by injection and subsequently orally) for 24 weeks in the best-reported trials. The double-blind study's findings imply that mesoglycan greatly accelerated the healing of the leg ulcers.

In Mexico, skin issues are treated with the bark of the Mimosa tenuiflora tree. The use of a gel containing M. tenuiflora extract may also aid in the healing of such vein-related leg ulcers, according to a small, double-blind, placebo-controlled trial.

Pineapple juice and the stems of pineapple plants include a variety of protein-digesting enzymes that collectively make up bromelain. Bromelain has antiedema effects that are comparable to those of varicose vein therapies, indicating that it may be beneficial even though there is no direct evidence of its usage for varicose veins.

Although the plant Collinsonia, sometimes known as stone root, has long been used orally to treat hemorrhoids and varicose veins, it has not undergone any significant scientific testing. This also applies to topical calendula, comfrey, and witch hazel. Apple cider vinegar applied topically has demonstrated modest efficacy in alleviating varicose vein symptoms. The majority of patients experienced reduced pain, swelling, and itching, however this was best achieved with other treatment regimens.

For the treatment of varicose veins, balneotherapy—which uses aquatic spa treatments like warm and cold baths, mud packs, saunas, and steam baths—has been encouraged. In participants with moderate to severe varicose veins, four daily balneotherapy sessions for three weeks dramatically improved skin changes and quality of life when compared to a group waiting to receive the therapy, according to a small randomized research conducted in France.

Varicose veins frequently develop organically as people age or as a result of hormonal changes brought on by life events like menopause or pregnancy. Varicose veins can be prevented rather than treated, as is the case with most medical disorders. Maintaining a healthy weight through diet and exercise is the key to prevention. Varicose veins can develop as a result of increased venous pressure brought on by obesity. Posture is another preventive measure; avoiding leg crossing while seated can aid in prevention. Wearing tight clothing or sitting or standing for extended periods of time might exacerbate this issue.

FUTURE SCOPE

The future scope of phytochemical-based therapy for varicose veins includes:

- Standardization and quality control of herbal formulations
- Advanced clinical trials to establish efficacy and safety
- Development of novel drug delivery systems (Nano formulations, transdermal patches)
- Integration with modern vascular therapy
- Personalized herbal medicine based on patient-specific risk factors
- Increased acceptance in evidence-based complementary medicine

DISCUSSION

By addressing the underlying causes of varicose veins rather than just their symptoms, phytochemicals provide a multifaceted approach. Herbal chemicals typically exhibit higher tolerance and fewer negative effects than synthetic pharmaceuticals.

But there are still issues:

Changes in the phytochemical composition

Variations in dose types

Few excellent randomized clinical trials Not with standing these drawbacks, mounting data demonstrates the therapeutic value of plant-based venotonics, particularly for long-term care.

CONCLUSION:

Varicose veins represent a multifactorial vascular disorder primarily caused by venous valve incompetence, altered shear stress, venous wall hypoxia, and chronic inflammation. Phytochemical-based therapies provide a valuable complementary approach in managing this condition by targeting underlying pathophysiological mechanisms rather than

merely addressing symptoms. Bioactive compounds found in medicinal plants such as Centella asiatica and Terminalia arjuna enhance venous tone, strengthen connective tissue, reduce inflammation, improve microcirculation, and decrease capillary leakage. Although natural treatments may not completely cure varicose veins, they have demonstrated effectiveness in reducing pain, edema, and disease progression with fewer side effects compared to synthetic drugs. Further clinical studies and standardization of herbal formulations are essential to validate their long-term efficacy and safety. Overall, phytochemicals hold significant potential as supportive agents in the holistic management of varicose veins and chronic venous disease.

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