
A Review: Role of Herbal Extract for Treatment of Varicose Veins

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Abstract

Treatment plans tailored to individual patient characteristics and highlights ongoing research into new therapeutic options. By consolidating current insights, this review aims to deepen This study aimed to review the current treatment options for varicose veins. There are several management options. The publications on the treatment of varicose veins are evaluated, and postoperative complications and efficacy were assessed. Surgical stripping were more painful and require longer recovery times than foam sclerotherapy and radiofrequency ablation. Patients who undergo endovenous laser ablation or radiofrequency ablation are more likely to heal faster and return to work sooner. A controlled trial with randomization in many places is necessary to verify whether strategy is superior to others for the management of varicose veins. Varicose veins have a prevalent vascular disorder marked by swollen, twisted veins, primarily in the lower limbs. This review article offers an in-depth examination of the causes, underlying mechanisms, clinical symptoms, and treatment options for varicose veins. It explores the diverse factors contributing to venous insufficiency and valve malfunction, including genetic factors, hormonal influences, and lifestyle choices. The symptoms can range from aesthetic issues to serious complications like venous ulcers and deep vein thrombosis. Various diagnostic methods, particularly Doppler ultrasound, are discussed for their effectiveness in evaluating the condition's severity and guiding treatment decisions. Treatment strategies include conservative approaches, such as compression therapy and lifestyle changes, alongside interventional methods like sclerotherapy, endovenous laser treatment, and surgical procedures. This article underscores the need for personalized the understanding of varicose veins and enhance patient management outcomes.

Keywords – Varicose veins, venous insufficiency, postoperative complications, Doppler ultrasound, compression therapy, personalized treatment, and randomized controlled trial.

INTRODUCTION

Varicose vein is a kind of venous insufficiency that manifests as dilated, elongated, or convoluted veins caused by a persistent loss of valve effectiveness.^[1] Varicose veins are a prevalent chronic venous condition that greatly reduces the quality of life significantly impacts healthcare resources.^[2] The lower limb venous system is responsible for returning blood from leg towards heart. Chronic venous illness is caused by a lack of blood return due to anatomical or functional problems in the veins of the lower limbs.^[3] Primary venous diseases are thought to arise from inherent structural and metabolic issues in the vein wall. In more severe cases, skin problems and ulceration can occur due to the leakage of macromolecules and red blood cells, resulting in the activation of endothelial cells, the movement of leukocytes, and changes in tissue remodeling, characterized by significant collagen buildup.^[4] The leg weariness and heaviness caused by Chronic venous insufficiency can occur alongside varicose veins.^[5] Varicose veins can impact as many as one in three people of Western populations and can cause a variety of clinical symptoms, including asymptomatic, isolated varicose veins (C2 illness) and venous ulcers.^[6]

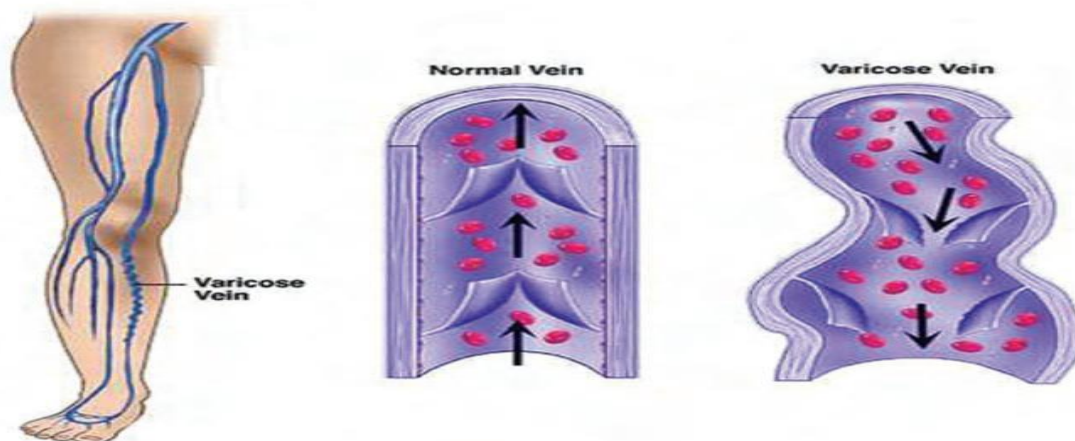


Figure1: Varicose Veins

Varicose veins are enlarged, twisted veins that often look dark purple or blue, primarily found in the legs and feet. They develop when the valves in the veins weaken or become damaged, leading to blood pooling instead of flowing back to the heart. This illness can cause symptoms like discomfort, edema, and heaviness in the affected areas.^[7] While varicose veins are commonly regarded as a cosmetic concern, they can occasionally suggest more significant vascular disorders. Genetics, age, weight, and lengthy periods of standing are all risk factors. Treatment options include lifestyle adjustments and compression stockings, as well as medical procedures such as sclerotherapy and laser therapy.^[8]

Pathophysiology

Incompetence of Venous Valve Valvular Dysfunction: The main reason behind varicose veins is a malfunctioning venous valve, which often stops blood flow backward. Blood can flow backward when these valves malfunction, raising the pressure in the veins that are impacted (venous reflux). **Incompetence Mechanisms:** Valve failure can result in various factors like connective tissue alterations, vein dilatation, and degradation of the valve leaflets.

Elevated Venous Pressure Hydrostatic Pressure: Prolonged standing or sitting raises the lower extremities' hydrostatic pressure. The venous system receives this pressure, which primarily affects the superficial veins. **Venous Hypertension:** Prolonged high pressure causes veins to enlarge even more, which exacerbates valve incompetence. This vicious loop keeps the illness alive.

Alterations in vein Structure Remodeling Vein Walls: The following structural alterations in the venous wall are brought on by chronic venous hypertension: **Changes in Collagen and Elastin:** Vein walls become weaker due to increased elastin and collagen breakdown, which makes them more prone to dilatation. **Changes in the Smooth Muscle Layer:** The smooth muscle layer may atrophy, which would further impair its capacity to restrict and control blood flow.^[9]

The Inflammatory Mechanisms Inflammation: Inflammatory processes within the vein wall are linked to chronic venous insufficiency and can result in: **Endothelial Dysfunction:** Endothelial cells may be harmed by inflammatory mediators, which may lead to additional vascular alterations. **Increased Permeability:** This may result in skin alterations like discolouration or ulceration as well as edema.

Elements of Hemodynamics Venous Stasis: Varicose veins are a result of the accumulation of blood in the lower extremities outcome of valve incompetence. Alteration in blood flow patterns lead to an increase in shear stress on venous walls, which in turn triggers inflammation and endothelial activation.^[10]

Hormonal and Genetic Factors Genetics: There is a hereditary component; specific genetic mutations impact the structure and function of collagen, which causes weakening in the vein wall. **Hormonal Influences:** Women are more than males to grow varicose veins, especially during pregnancy. This is because hormones, especially estrogen, can have an impact on venous tone and valve performance.

Obesity and Physical Activity. Obesity: Excess body weight puts pressure on the venous system, aggravating valve dysfunction and contributing to venous dilation. Sedentary Lifestyle: A lack of physical exercise can lead to venous stasis and wall deterioration. Conclusion The pathophysiology is defined by venous valve ineptness, increased venous pressure, structural changes in the vein wall, inflammatory reactions, and genetic predisposition.^[11]

Causes

Histological examinations of the varicose venous segment revealed oversynthesis of collagen type I, reduced production of collagen type III, disturbance of the organization of smooth muscle cells and elastin fibers. In venous valves subjected to high pressures, the concentration of neutrophils, monocytes, macrophages, and lymphocytes increased, as did the levels of matrix metalloproteinases.^[12]

Varicose veins are swollen, twisted veins that often appear dark blue or purple, typically found in the legs but can occur in other areas as well. Several key factors contribute to their development:

Genetics

A family history of varicose veins increases the likelihood of having them.

Age

As people get older, their veins become less flexible, making them more prone to becoming varicose. Hormonal changes: Fluctuations during pregnancy, menstruation, or menopause can weaken vein walls and valves.

Obesity

Extra weight puts additional pressure on the veins, leading to their expansion.

Prolonged standing or sitting

Jobs or lifestyles that involve extended periods of standing or sitting can hinder blood flow and elevate pressure in the veins.^[13]

Venous insufficiency occurs due to venous valves unable to function properly, causing blood to pool leads to form varicose veins. Physical inactivity can compromise circulation, leading to the development of varicose veins. Previous blood clots harm veins and valves, raising the chance of varicosity. Pregnancy: Increased blood volume and hormonal changes can cause varicose veins. Understanding these factors can help you manage risk and promote vascular health.^[14]

Physiological Effects

Varicose veins form when veins expand, twist, and overflow with blood. This disorder primarily affects the legs and has numerous physiological effects:

Increased Venous Pressure

The veins' valves may weaken or become ineffective, resulting in blood reflux. This increases the pressure in the veins, particularly when standing or walking. Distended Veins: The walls of the veins expand and weaken, causing noticeable bulging under the skin.

Reduced Blood Flow

Poor venous return can cause reduced blood flow to the affected areas, resulting in symptoms such as leg heaviness, weariness, or soreness.

Tissue Changes

Prolonged high pressure in veins can cause skin changes such as pigmentation and eczema. In severe situations, it might result in ulcers due to insufficient oxygen and nutrient delivery to tissues.^[15]

Inflammation: Blood stasis can activate inflammatory reactions, potentially leading to phlebitis (vein inflammation), which causes discomfort and swelling.

Increased chance of Thrombosis

Changed blood flow dynamics might raise the chance of blood clots, particularly superficial thrombophlebitis, which can cause pain and worsen the disease.

Compromised Circulation: Varicose veins can reduce overall venous return to the heart, potentially resulting in diminished circulation efficiency and weariness in affected limbs. **Complications:** In severe circumstances, continuous venous insufficiency can result in deep vein thrombosis (DVT) or chronic venous ulcers. Managing varicose veins typically include lifestyle adjustments, compression therapy, and, in some circumstances, surgical techniques to restore normal venous function.^[16]

Survey Report

Around 30% of respondents reported having varicose veins. People over the age of 50 have a higher prevalence (45%). **Awareness and Symptoms** 60% of respondents were aware of varicose veins. Only 25% could recognize signs like aches, swelling, and visible veins. **Symptoms reported:** 70% experienced pain. Fifty percent of people suffered leg edema. **Lifestyle Factors** **Sedentary Behavior:** 55% of respondents with varicose veins reported being sedentary. **Weight:** 40% of respondents reported being overweight, a known risk factor. 35% have a family history. **Treatment** Only 20% patients with varicose veins seek medical advice. **Treatment Options:** Among those affected: **Compression Stockings:** 50% **Sclerotherapy:** 30%. **Surgery:** 20%. 70% of respondents believe treatments are effective.

Demographic insights

Females have a higher prevalence (40%) compared to males (20%). - People over the age of 40 were more likely to experience symptoms. 4. **Treatment Awareness:** - Half of respondents were unaware of available treatments. - Of those who were aware, 60% selected non-invasive treatments (compression therapy and lifestyle adjustments). - Only 25% considered surgical procedures such as sclerotherapy or laser treatment. 5. **Attitudes and Concerns:** - 70% of interviewees viewed varicose veins as a cosmetic concern. - 30% of respondents expressed concern about discomfort and potential consequences.

Symptoms**Prominent or Twisted Veins**

Varicose veins often appear as large, dark-colored veins that are bulging or twisted, particularly visible on the legs and thighs.

Discomfort or Pain

Individuals with varicose veins may experience discomfort such as throbbing, aching, or a heavy sensation in the affected areas. These symptoms tend to worsen with prolonged periods of standing or sitting.

Swelling

Swelling in the feet, ankles, or lower legs is common, especially after standing for long durations, creating a feeling of tightness or pressure in the legs.^[17]

Skin Changes

Over time, the skin around varicose veins may change in color, appearing darker. It may also become dry, itchy, or thin. In severe cases, ulcers can develop near the veins.

Cramping and Itching

People with varicose veins sometimes experience muscle cramps or itching around the veins, likely due to skin irritation caused by the veins.^[18]

Restless Legs Syndrome

Some individuals with varicose veins develop restless legs syndrome, characterized by a strong urge to move the legs due to uncomfortable feelings, particularly at night.

Heaviness or Fatigue in the Legs

The legs may feel unusually heavy, tired, or weak, particularly after standing for long periods.^[19]

Bleeding

Though rare, varicose veins can rupture, causing bleeding, especially if the veins are close to the skin's surface.

Burning or Throbbing Sensation

A burning or throbbing feeling in the affected area can occur, especially when the veins are inflamed.^[20]

Clinical Implications

Varicose veins, which are characterized by swollen and twisted veins, primarily affect the legs and can have a variety of clinical repercussions. Symptom Management: Patients frequently report pain, heaviness, edema, and discomfort in their affected limbs.^[21] Effective symptom management is critical to increasing quality of life. Complications: Venous Insufficiency: Poor blood flow can result in chronic venous insufficiency, which causes skin changes and ulceration. Thrombophlebitis: Inflammation of the vein can cause thrombosis and discomfort. Patients may develop dermatitis, hyperpigmentation, or venous ulcers, necessitating dermatological diagnosis and treatment. Psychosocial Impact: The apparent form of varicose veins can cause self-esteem concerns and worry, affecting the patient's mental health.^[22]

Etiology

Varicose veins, commonly observed in the legs, are dilated, twisted veins caused by a variety of factors that disrupt normal venous function. The development of varicose veins is influenced by genetic, mechanical, and environmental factors.

Venous Valve Dysfunction

Valve Failure

Varicose veins primarily arise from incompetence of venous valves. In healthy veins, valves prevent backward blood flow. When these valves become ineffective, blood accumulates in the veins, causing them to enlarge and twist.

Increased Venous Pressure

Chronic high venous pressure, often from conditions like deep vein thrombosis, pregnancy, or prolonged standing, can lead to vein dilation and valve failure.^[23]

Genetic Factors

Inherited Risk

There is a significant genetic predisposition to varicose veins. Studies suggest that specific gene variations affecting collagen and elastin production can make veins more susceptible to dilation and valve failure.

Collagen Deficiencies

Genetic mutations in collagen and elastin-related genes may lead to structural weakness in the veins, making them more prone to distention and valve dysfunction.

Family History

A family history of varicose veins increases the likelihood of developing the condition, highlighting the genetic component involved.

Hormonal Changes

Pregnancy

Pregnancy brings hormonal changes, particularly elevated progesterone levels, which relax venous smooth muscle, causing veins to dilate. The expanding uterus also compresses pelvic veins, affecting blood flow from the legs.

Estrogen and Progesterone

These hormones may weaken vein walls, making women more prone to varicose veins. Hormonal treatments like contraceptives and hormone replacement therapy can also heighten the risk.^[24]

Prolonged Standing and Intra-abdominal Pressure**Occupational Factors**

Jobs that involve long periods of standing or sitting increase pressure in the leg veins, hindering blood return to the heart. Extended immobility worsens the situation by reducing circulation.

Abdominal Pressure

Conditions like pregnancy, obesity, or constipation raise intra-abdominal pressure, which in turn impedes venous return from the legs and can contribute to varicose veins.

Obesity**Increased Load on Veins**

Excess body weight increases pressure on the lower extremity veins, which can weaken vein walls and lead to varicose veins.

Inflammation

Fatty tissue can release inflammatory substances that worsen venous conditions, including valve dysfunction and vein dilation.

Age**Age-Related Venous Changes**

As people age, their veins lose elasticity, and the valves become less efficient. This makes older individuals more susceptible to venous insufficiency and varicose veins, with the risk rising after age 50.



Figure 2: Change in skin

Sedentary Lifestyle**Poor Circulation**

Lack of physical activity impairs circulation and venous return, contributing to the formation of varicose veins. Regular movement is essential for maintaining proper venous health.^[25]

Trauma or Injury to Vein**Vein Damage**

Physical injury to the legs or previous conditions like deep vein thrombosis (DVT) can damage venous valves, leading to venous insufficiency and varicose veins.

Chronic Venous Insufficiency (CVI)

Progression of Varicose Veins

Untreated varicose veins can lead to chronic venous insufficiency, characterized by poor blood flow, skin changes, and leg swelling.^[26]

Clinical Manifestations

Varicose veins (VV) are a prevalent vascular disorder characterized by dilated, twisted veins, primarily in the lower limbs. They result from valve dysfunction, leading to venous reflux and blood pooling. The clinical features of varicose veins can range from mild symptoms to more severe complications. Below are the main clinical signs:

Visible Vein Distension

Appearance

Varicose veins are typically noticeable as enlarged, twisted, and dark blue or purple veins under the skin, mainly affecting the legs and feet.

Location

Commonly, the great saphenous vein and its branches are involved, but other veins in the lower extremities can also be affected.

Pain and Heaviness

Patients often experience a sensation of heaviness, aching, or fullness in the legs, particularly after standing or walking for long periods. This is due to venous stasis and blood pooling in the veins.

The pain is usually aggravated by prolonged standing or sitting and relieved by elevating the legs or walking.^[27]

Swelling (Edema)

Swelling around the ankles and feet is common in those with varicose veins, becoming more noticeable towards the evening or after prolonged standing.

Persistent swelling may eventually lead to skin changes like pigmentation or even ulceration.

Itching and Skin Alterations

Itching

Many patients report itching around the varicose veins, often linked to venous stasis dermatitis or the accumulation of waste products in the blood.

Skin Discoloration

Over time, the skin over varicose veins may become discolored, appearing brown or reddish, especially near the ankles.

Ulcer Formation

Chronic venous insufficiency can result in painful leg ulcers, typically near the ankle, caused by poor venous drainage and skin breakdown.^[28]

Restless Legs Syndrome (RLS)

Some individuals with varicose veins may experience symptoms of RLS, including an uncontrollable urge to move their legs, especially at night.

Leg Cramps and Muscle Twitching

Nighttime leg cramps and muscle twitching are common in people with varicose veins, often exacerbated by venous stasis and impaired circulation.^[29]

Varicose Eczema and Inflammation

Varicose Eczema

Chronic varicose veins can cause skin inflammation, known as varicose eczema, which presents as red, inflamed, scaly areas, typically seen on the lower legs.

Superficial Thrombophlebitis

Varicose veins are associated with a higher risk of superficial thrombophlebitis, a condition where blood clots form in the superficial veins, causing pain, redness, and warmth along the affected vein.

Severe Complications

Venous Ulcers: Long-standing venous insufficiency can lead to venous ulcers, typically near the inner ankle, which can be slow to heal and are prone to infection.

Bleeding

Varicose veins, due to their enlarged and fragile nature, may rupture after minor trauma, resulting in significant bleeding.

Deep Vein Thrombosis (DVT)

Although rare, varicose veins can increase the risk of deep vein thrombosis, which involves blood clots forming in the deep veins and impeding blood flow.^[30]

Diagnosis

Varicose veins are dilated and twisted veins that most typically found in the lower limbs. The entire etiology is unknown, however it includes a hereditary susceptibility, infected valves weaken arterial walls and increase pressure within the veins.^[31]

A physical examination is the initial step in diagnosing varicose veins. In a patient standing upright, venous reflux between the inguinal region and the foot should be evaluated using duplex ultrasonography (DUS), which is a straightforward and non-invasive technique for examining the anatomy and function of leg veins. Reflux is identified as backward flow that persists for more than 0.5 seconds in superficial veins, over 0.35 seconds in perforating veins, or longer than 1.0 seconds in deep veins.^[32]

Varicose veins are commonly diagnosed using the steps listed below:

Medical History

The doctor will inquire about your symptoms, family history, and any prior medical concerns.

Physical Examination

Inspect the legs while standing for enlarged veins, skin changes, or other symptoms of venous insufficiency.^[33]

Ultrasonography

A Doppler ultrasonography is commonly used to examine blood flow and detect valve dysfunction or vein obstructions.

Additional Imaging

When problems or other difficulties are detected, more imaging techniques such as CT or MRI may be employed. The diagnosis is based on symptoms and physical observations, with ultrasonography providing confirmation of venous anomalies.^[34]

Duplex Sonography

Duplex sonography is a non-invasive imaging method that integrates traditional ultrasound (B-mode) with Doppler ultrasound to visualize and evaluate blood flow in vessels. It is particularly valuable for diagnosing vascular issues, assessing blood circulation, and informing treatment choices.

Key Aspects of Duplex Sonography

B-mode Imaging

Provides two-dimensional grayscale images of blood vessels and surrounding tissues.

Doppler Imaging

Measures blood flow velocity, helping to identify conditions like stenosis or thrombosis.

Color Doppler

Displays blood flow direction and speed using color coding to illustrate flow dynamics.

Power Doppler

More sensitive to low-velocity blood flow, often useful when color Doppler is less effective.^[35]

Uses

Carotid Artery Disease: Evaluating stenosis and plaque.

Peripheral Vascular Disease: Assessing blood flow in the extremities.

Deep Vein Thrombosis (DVT): Identifying clots in veins.

Renal Artery Assessment: Checking for renal artery stenosis.

Post-surgical Monitoring: Tracking vascular grafts and stents.

Management Of Varicose vein

Here are some management strategies:

Lifestyle Modifications
Weight Management Maintaining a healthy weight will alleviate pressure on veins. **Exercise** Consistent physical activity helps boost circulation. **Avoid Prolonged Sitting or Standing** Take breaks and move around. **Elevate Legs** Elevating your legs can assist minimize edema.^[36]

Compression Therapy
Compression Stockings Wearing graduated compression stockings can enhance blood flow and decrease swelling.

Medical Treatments
Sclerotherapy Inject a solution into afflicted veins to shut and fade. **Laser Therapy** Laser treatments can seal off tiny varicose veins.

Endovenous Laser Treatment (EVLT)

A vein seal is shut **Radiofrequency Ablation** This procedure includes heating the vein to seal it.^[37]

Surgical Options
Vein Stripping A surgical treatment for removing big varicose veins. **Ambulatory Phlebectomy** Small incisions are used to remove surface veins.

Follow-Up Care Regular check-ups to monitor problems and evaluate treatment efficacy.

Education and Awareness- Informing patients on their disease, hazards, and self-care strategies. A consultation with a healthcare specialist is required to establish the best appropriate treatment depending on the unique circumstances.^[38]

Treatment

Varicose veins can be treated in a variety of ways, based on severity of the condition and symptoms. Here are some primary therapeutic options:

Lifestyle Changes Exercise

Regular physical exercise boosts circulation. **Weight Management:** Losing weight can relieve pressure on veins. **Elevating your legs** can help minimize swelling and discomfort. **Avoiding Prolonged sitting or standing:** Regular movement helps to prevent blood pooling.

Compression Therapy

Graduated compression stockings can assist improve blood flow and decrease edema.

Medical treatments

Sclerotherapy implies injecting a fluid into a vein. **Laser Treatment:** Closes tiny veins using focused laser light. **Endovenous Laser Treatment (EVLT)** implies insertion of a laser fiber into a vein to seal it. **Radiofrequency ablation:** Uses radiofrequency energy.

Surgical options Vein stripping is the removal of bigger varicose veins by tiny incisions. **Ligation and stripping** include tying up and removing a vein to increase blood flow.

Alternative Treatments

Some people investigate herbal therapies or dietary supplements; however, these should be reviewed with a healthcare physician.^[39]

Venoactive Drugs (Venotonics)

Venoactive medications are mainly used to improve venous wall tone, enhance blood flow, and reduce venous stagnation. They are helpful in treating mild to moderate varicose veins and in alleviating symptoms like swelling, pain, and a heavy feeling in the legs.

Common Venoactive Medications

Diosmin and Hesperidin

These are flavonoids that work to improve venous tone, reduce capillary leakage, and promote lymphatic drainage. Diosmin is often used in combination with hesperidin for better results.

Mechanism

They have anti-inflammatory properties, protect blood vessel linings, and improve venous tone.

Rutosides (Rutin, Troxerutin)

Rutosides have anti-inflammatory, antioxidant, and venotonic effects, frequently used for treating chronic venous insufficiency (CVI) and varicose veins.



Figure 3: Rutin

Mechanism

They help strengthen capillaries, reduce inflammation, and promote venous return.^[40]

Horse Chestnut Extract (*Aesculus hippocastanum*)

This herbal remedy is used for its venotonic and anti-inflammatory properties. It's available in both oral and topical forms.



Figure 4: Horse Chestnut Extract

Mechanism

It helps improve venous tone, reduces swelling, and eases varicose vein symptoms.^[41]

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Butcher's Broom (*Ruscus aculeatus*)

An herbal extract containing ruscogenins, which help improve venous tone and circulation.



Figure 5: Ruscus Aculeatus Root Extract

Mechanism

It stimulates venous muscle contraction, reducing venous stagnation and improving circulation.^[42]

Flavonoid-based Formulations

Flavonoids are natural compounds with strong antioxidant, anti-inflammatory, and venotonic effects. Oral formulations containing flavonoids such as quercetin and diosmin are commonly used to manage varicose veins and symptoms of chronic venous insufficiency.^[43]

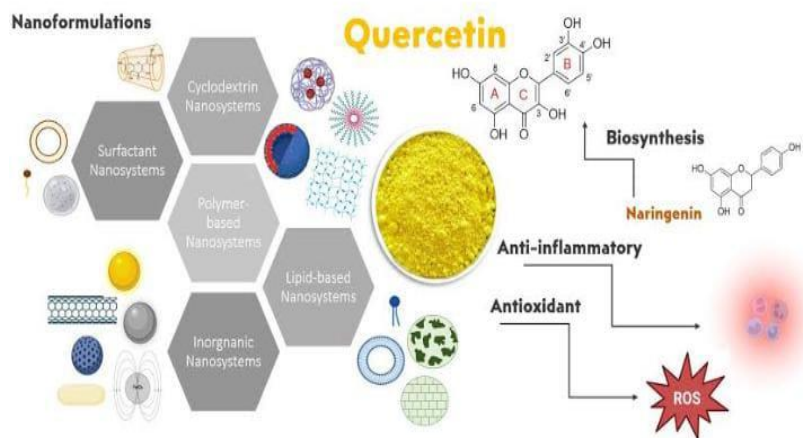


Figure 6: Quercetin

Mechanism

These compounds protect blood vessel linings, reduce oxidative stress, and improve venous wall elasticity.^[44]

Anticoagulants and Antiplatelet Medications

In patients with advanced varicose veins or those at risk of deep vein thrombosis (DVT), anticoagulants or antiplatelet medications may be prescribed.

Warfarin and Direct Oral Anticoagulants (DOACs)

These drugs may be used in patients with varicose veins who are at risk of developing blood clots.

Mechanism

These medications prevent blood clotting by inhibiting clotting factors.^[45,46]

CONCLUSION

Varicose veins represent a significant clinical challenge, affecting a substantial portion of the population and contributing to both cosmetic concerns and serious difficulty like chronic venous insufficiency and venous ulcers. Underlying pathology involves structural and functional complications in the venous system, leading to impaired blood flow, endothelial activation, and tissue remodeling. Treatment approaches must be tailored to the individual, with options ranging from conservative management to advanced interventional techniques. Continued research is essential to improve diagnostic tools and treatment strategies that ultimately improve patient outcomes helps to reducing the healthcare burden associated with varicose vein disease.

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