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Herbal Remedies for Varicose Veins and Chronic Venous Insufficiency

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Abstract: *Varicose veins and chronic venous insufficiency (CVI) are common manifestations of chronic venous disease characterized by venous reflux, venous hypertension, endothelial activation, inflammation, oxidative stress, microvascular dysfunction, edema, pain, and, in advanced cases, skin changes and venous ulceration [1]. While compression therapy and venous interventions remain the cornerstone of care, many patients use herbal and plant-derived preparations for symptom relief. This updated review summarizes the most relevant botanical venotonic agents, including horse chestnut seed extract (Aesculus hippocastanum), butcher's broom (Ruscus aculeatus), Centella asiatica, grape seed extract (Vitis vinifera), Pycnogenol® (Pinus pinaster bark extract), red vine leaf extract, and flavonoid-based preparations such as micronized purified flavonoid fraction (MPFF) [2–5].*
Across the available literature, these agents appear to improve symptoms such as leg heaviness, aching, cramps, pruritus, and edema, primarily through venotonic, anti-inflammatory, antioxidant, capillary-protective, and microcirculatory effects [3,6]. However, the evidence is heterogeneous, many trials are small or short-term, and standardization of extracts remains a major limitation [7,8]. Herbal remedies therefore should be considered adjunctive therapies rather than replacements for evidence-based venous care [1].

Keywords: varicose veins; chronic venous insufficiency; chronic venous disease; herbal medicine; horse chestnut; butcher's broom; Centella asiatica; Pycnogenol®; red vine leaf extract; flavonoids; venotonic agents.

I. INTRODUCTION

Chronic venous disease affects a large proportion of adults and encompasses a spectrum from uncomplicated varicose veins to advanced CVI with edema, skin pigmentation, lipodermatosclerosis, and venous ulceration [1]. Varicose veins are dilated and tortuous superficial veins, usually involving the lower limbs, whereas CVI refers to a more advanced hemodynamic disorder caused by venous reflux and venous hypertension [1].

Modern understanding of CVI extends beyond a purely mechanical model. Venous hypertension triggers endothelial dysfunction, leukocyte recruitment, inflammatory mediator release, oxidative stress, and progressive remodeling of the venous wall and surrounding tissues [1,5]. These mechanisms explain the clinical progression from mild discomfort to edema, skin changes, and ulcer formation. Consequently, treatment aims not only to correct reflux or reduce pressure but also to improve symptoms, limit inflammation, and enhance microcirculation [1].

Standard management includes duplex ultrasonography, compression therapy, lifestyle modification, and, when appropriate, endovenous or surgical intervention [1,9]. However, many patients seek complementary therapies, particularly herbal remedies perceived as natural and safer. The rationale for these agents is biologically plausible because plant-derived compounds may influence venous tone, capillary permeability, inflammatory pathways, and extracellular matrix integrity [2,6].

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Pathophysiology of Varicose Veins and CVI:-

The pathogenesis of varicose veins and CVI is multifactorial. Valve incompetence causes reflux, which increases venous pressure and produces stasis, capillary leakage, edema, and tissue hypoxia [1]. Over time, chronic inflammation and oxidative stress further damage the venous wall and microvasculature, contributing to skin changes and ulceration [1,5].

Important pathophysiological features include:

Venous hypertension and reflux

Incompetent valves allow retrograde flow, increasing pressure in superficial veins [1].

Endothelial activation and inflammation

Venous hypertension promotes leukocyte adhesion, inflammatory signaling, and endothelial dysfunction [1,5].

Increased capillary permeability

Fluid extravasation leads to swelling, heaviness, and discomfort [6].

Microcirculatory and tissue injury

Chronic edema and hypoxia impair tissue repair and may culminate in venous ulcers [1,10].

Extracellular matrix remodeling

Enzymatic degradation and connective tissue weakening contribute to venous dilation and valve failure [2].

These mechanisms provide the scientific basis for using venotonic and anti-inflammatory herbal agents as adjuncts in chronic venous disease.

Rationale for Herbal Therapy

Herbal remedies used in venous disorders are generally proposed to act through several overlapping mechanisms:

improving venous tone and reducing pooling [6]
decreasing capillary permeability and edema [3]
suppressing inflammatory pathways [3,5]
exerting antioxidant effects [3,11]
protecting collagen and extracellular matrix integrity [3]
improving microcirculatory function and symptom burden [2,4]

Because CVI is progressive and inflammatory in nature, these actions are theoretically relevant. Yet, the clinical effect of herbal preparations is typically modest and best suited to symptom control rather than definitive correction of reflux or advanced disease [1].

Major Herbal and Plant-Derived Remedies

1. Horse Chestnut Seed Extract (Aesculus hippocastanum)

Horse chestnut seed extract is among the best-studied herbal therapies for CVI. Its major active component, aescin (escin), has anti-inflammatory, anti-edematous, and venotonic properties [7,11]. Clinical evidence suggests improvements in leg pain, pruritus, fatigue, calf spasm, and limb volume reduction, making it a frequently used botanical option for symptomatic relief [7,12].

Mechanistically, horse chestnut may reduce capillary fragility and inhibit hyaluronidase, thereby limiting edema and preserving extracellular matrix integrity [2,11]. Importantly, only standardized seed extracts should be used; raw seed

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material is toxic and unsuitable for self-medication [7]. Product quality and aescin content may vary considerably across commercial preparations [7].

2. Butcher's Broom (Ruscus aculeatus)

Butcher's broom has a long traditional history in venous disorders. Its active constituents, especially ruscogenins, are thought to exert anti-elastase activity and support venous constriction, capillary integrity, and microcirculatory function [2]. The available evidence base is smaller than that for horse chestnut, but the pharmacological profile is consistent with symptomatic venotonic use [2].

3. Canella asiatica

Centella asiatica contains triterpenoids such as asiaticoside, which are associated with connective tissue support, wound healing, and anti-inflammatory actions [13,14]. In the context of chronic venous disease, the proposed relevance is strengthening venous wall integrity, improving microvascular function, and supporting tissue repair [2].

Although Centella is biologically plausible and widely used in traditional medicine, direct high-quality clinical evidence in varicose veins and CVI remains limited [2]. Its role may be more supportive than disease-modifying.

4. Grape Seed Extract (Vitis vinifera)

Grape seed extract is rich in proanthocyanidins and is marketed for vascular health. It has antioxidant and endothelial-protective properties and may improve capillary resistance and reduce swelling [2]. A recent randomized comparison showed that Vitis vinifera seed extract was non-inferior to MPFF in relieving venous symptoms and improving quality of life in chronic venous disease [15]. This makes grape seed extract one of the more clinically interesting plant-derived alternatives.

5. Pycnogenol® (Pinus pinaster Bark Extract)

Pycnogenol® has one of the stronger evidence bases among plant-derived venous agents. It exhibits antioxidant, anti-inflammatory, vasodilatory, antithrombotic, and collagen-stabilizing effects, making it particularly relevant to the multifaceted pathophysiology of CVI [3]. Clinical studies reported reduction in leg edema and symptomatic improvement in chronic venous disease [3].

Comparative work has also evaluated Pycnogenol® against horse chestnut extract in CVI, reinforcing its role as a clinically useful venotonic preparation [12]. Overall, Pycnogenol® appears promising for symptom reduction, though formulation differences and long-term comparative studies remain important limitations [3].

6. Red Vine Leaf Extract (Vitis vinifera Leaf; AS 195)

Red vine leaf extract has been examined in systematic review form and is used traditionally for symptoms of CVI such as edema, heavy legs, pain, cramps, and skin discomfort [4]. The extract is generally considered a plant-derived venotonic with anti-edematous and microcirculatory benefits. As with other herbal preparations, the magnitude of benefit is modest and depends on extract standardization and study design [4].

7. Flavonoid-Based Preparations and MPFF

MPFF is not a herb in the strict botanical sense, but it is central to any review of plant-derived venous therapies. Contemporary evidence indicates that MPFF acts on inflammation, microvessel permeability, valve and vessel wall remodeling, and reflux, with benefits seen across a wide spectrum of chronic venous disease severity [5]. It is highly recommended in international guidelines and is the only venoactive drug noted for guideline endorsement of quality-of-life improvement [5].

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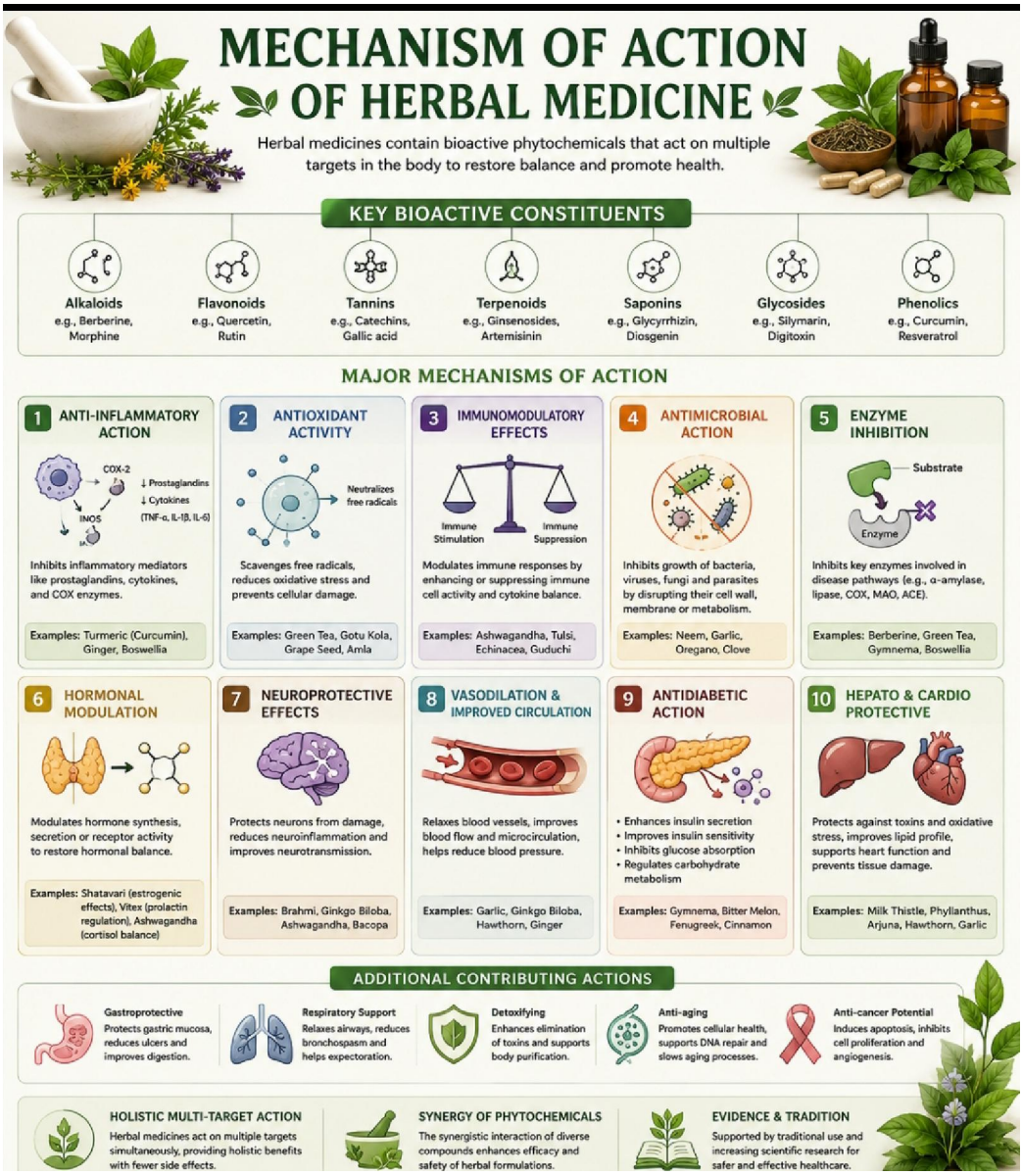
Flavonoid combinations containing troxerutin, diosmin, and horse chestnut extract also demonstrate supportive effects on venous tone, microcirculation, and inflammatory mediators, strengthening the argument that plant-derived compounds may be best used as adjuncts rather than standalone cures [6].

Mechanisms of Action

The therapeutic rationale for herbal remedies in varicose veins and CVI can be summarized as follows:



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Venotonic Effects
Some botanical agents enhance venous tone and reduce venous pooling, which may lessen heaviness and discomfort [6].

Anti-inflammatory Effects
Several preparations reduce inflammatory signaling and endothelial activation, which are central to CVI progression [3,5].

Anti-edema Effects
By lowering capillary permeability, these agents may reduce fluid extravasation and tissue swelling [3,7].

Antioxidant Effects
Oxidative stress contributes to vascular injury; horse chestnut and Pycnogenol® have notable antioxidant properties [3,11].

Extracellular Matrix Protection
Inhibition of enzymes such as elastase and hyaluronidase may help preserve connective tissue and capillary integrity [2,11]

Microcirculatory Support
Some agents improve capillary resistance and local perfusion, supporting symptom relief and tissue health [2,4].

Clinical Evidence
Overall, the available literature supports modest symptomatic benefit from several herbal and plant-derived remedies in venous disease. The most frequently reported improvements include:

- leg heaviness
- edema
- aching or pain
- cramps
- fatigue
- pruritus [2,3]

Horse chestnut seed extract has relatively consistent evidence for symptom improvement and limb volume reduction [7,12]. Pycnogenol® also shows beneficial effects on edema and symptom burden [3]. MPFF remains the most guideline-supported plant-derived venoactive therapy and has evidence of benefit across CEAP categories [5]. Grape seed extract has emerging evidence, including non-inferiority to MPFF in one clinical trial [15]. Red vine leaf extract also shows symptomatic promise in systematic review evidence [4].
Nevertheless, the evidence base has several limitations:

- small sample sizes
- short follow-up periods
- subjective outcomes
- variable extract quality
- inconsistent dosages
- few head-to-head comparisons [7,8]

As a result, the therapeutic signal is real, but the certainty of evidence varies substantially among agents.

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Safety and Quality Considerations

Herbal remedies are frequently perceived as inherently safe, but this assumption is not justified. Important concerns include

- gastrointestinal adverse effects
- allergic reactions
- contamination or adulteration
- batch-to-batch variability
- uncertain dosing
- herb–drug interactions, especially with anticoagulants or antiplatelet agents
- caution in pregnancy, lactation, and complex systemic illness [7,8]

Horse chestnut deserves special caution because raw seed material is toxic and should not be used without standardization [7]. Product quality also matters: commercial preparations may contain variable amounts of active constituents, limiting reproducibility and safety [7].

Patients with unilateral swelling, severe pain, ulceration, bleeding varices, or suspected infection should undergo proper medical evaluation rather than relying on self-treatment [1,16]. Herbal therapy should never delay compression therapy, duplex assessment, or intervention when clinically indicated [1,9].

Role in Integrated Care

The most appropriate place for herbal remedies is as adjunctive therapy within a broader venous care plan. They may be considered in:

- patients with mild-to-moderate symptoms
- individuals seeking noninvasive symptomatic relief
- patients already using compression therapy
- those with chronic venous disease who need supportive symptom control [1,5]

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A practical integrated approach includes:
1. lifestyle modification and exercise
2. leg elevation
3. compression therapy
4. vascular evaluation when appropriate
5. endovenous or surgical treatment if indicated
6. adjunctive herbal or flavonoid-based therapy for symptom relief [1,9]

This approach aligns with the understanding that chronic venous disease is progressive and multifactorial rather than a simple superficial vein disorder [1].

Future Directions

Further research should prioritize:

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- large randomized controlled trials
- standardized botanical extracts
- objective outcomes such as edema volume and venous hemodynamics
- longer follow-up
- comparative effectiveness studies
- safety surveillance and herb–drug interaction studies [7,8]

There is also a need to better define which patients benefit most from specific plant-derived therapies and whether combination regimens offer advantages over single-agent treatment [5,6].

II. CONCLUSION

Herbal remedies have a meaningful but supportive role in varicose veins and chronic venous insufficiency. The most relevant plant-derived agents include horse chestnut seed extract, butcher's broom, Centella asiatica, grape seed extract, Pycnogenol®, red vine leaf extract, and flavonoid-based preparations such as MPFF [2–5]. These agents may improve symptoms and reduce edema through venotonic, anti-inflammatory, antioxidant, and microcirculatory mechanisms [3,6].

However, evidence quality remains uneven, standardization is a recurring problem, and long-term safety data are limited. Herbal therapy should therefore be used as an adjunct to evidence-based venous care, not as a substitute for compression, diagnostic evaluation, or interventional treatment when required [1,9].

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