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A REVIEW ON PHYTOTHERAPEUTIC APPROACHES IN VARICOSE VEIN MANAGEMENT

[1]Jegadeesh.S,[1]Thangalakshmi.P,[2]Janani J,[2]Nishalini.K,[2]Immenual.P,[2]Sabari Kannan.C,[3]Neelaveni Thangavel
[1]Associate Professor,[2]Final year students,[3]Principal
[1]Department of Pharmacognosy
[1]RVS College of Pharmaceutical Sciences,Coimbatore,India

Abstract **:** Varicose veins are dilated, tortuous veins that commonly occur in the lower limbs due to venous valve incompetence and impaired blood circulation. This review compiles information on 100 medicinal plants traditionally and scientifically reported for the management of varicose veins and associated venous disorders. The selected plants were categorized according to their pharmacological actions, including strengthening of venous walls, reduction of inflammation and edema, and antioxidant activity. Major phytochemical constituents such as flavonoids, alkaloids, saponins, tannins, triterpenoids, and phenolic compounds contribute to the therapeutic potential of these plants. The review highlights the role of phytotherapeutic agents as promising alternatives or supportive treatments for the management of varicose veins.

IndexTerms **- Varicose veins, Phytotherapy, Medicinal plants, Venous insufficiency, Herbal medicine**

I. INTRODUCTION

Varicose veins refer to enlarged, sac- like expansions of veins that often appear twisted. Jobs requiring extended standing, like those of bus drivers and police officers, heighten than risk for workers in these roles. It can also affect individuals engaged in heavy muscle exertion, such as rickshaw pullers and athletes. Varicose vein develops due to standing upright against gravity. The main sign is leg pain or a heavy feeling that gets worse during the day or after long standing, and it improves with leg raising or tight stockings. Ankle puffiness and skin itch are less common. Twisted, swollen veins under the skin are easy to see in most cases. These affect the big saphenous veins in about 60% of cases and the small one in 20%. Bad vein valves and weak vein walls causes them. Long-term cases lead to poor vein functions. Others cause include Blocked veins from pregnancy, Womb growths, Ovary lumps, pelvic tumors, Belly fluid, or leg clots. Common risks are long hours on feet, getting older, being overweight, hormone pills, and similar factors. Seen varicose veins occur in 25-30% of grown women and 15% of men. Individuals who work in long-term positions. Varicose vein treatment in modern science includes surgical procedures such as Stripping and Sclerotherapy. However, these procedures have drawbacks and do not provide complete relief [3,5,9].

II. PATHOPHYSIOLOGY

Normal venous circulation in the lower limbs depends on the coordinated functioning of venous valves, calf muscle pumping, and unobstructed blood flow towards the heart. When venous valves become incompetent, blood reflux occurs, leading to increased venous pressure and dilation of superficial veins. Chronic venous insufficiency may result from several factors including venous wall dysfunction, valvular incompetence, deep venous thrombosis, and structural abnormalities in the venous system. Persistent venous hypertension can eventually lead to edema, skin changes, and venous ulceration[4,8,10].

III.STAGES INVOLVED

Stage1 – Telangiectasia **(**visible widening of small blood vessels near the surface of the skin often appearing as thin red or purple "spider veins").
Stage2 – varicose vein (diameter of varicose vein is greater than or equal to 3mm which makes it differ from reticular vein which are in diameter).
Stage3 - edema (swelling).
Stage4a - pigmentation or eczema
Stage4b –fatty skin hardening/ white atrophy
Stage5 – healed venous ulcer
Stage6 – venous insufficiency ulceration.

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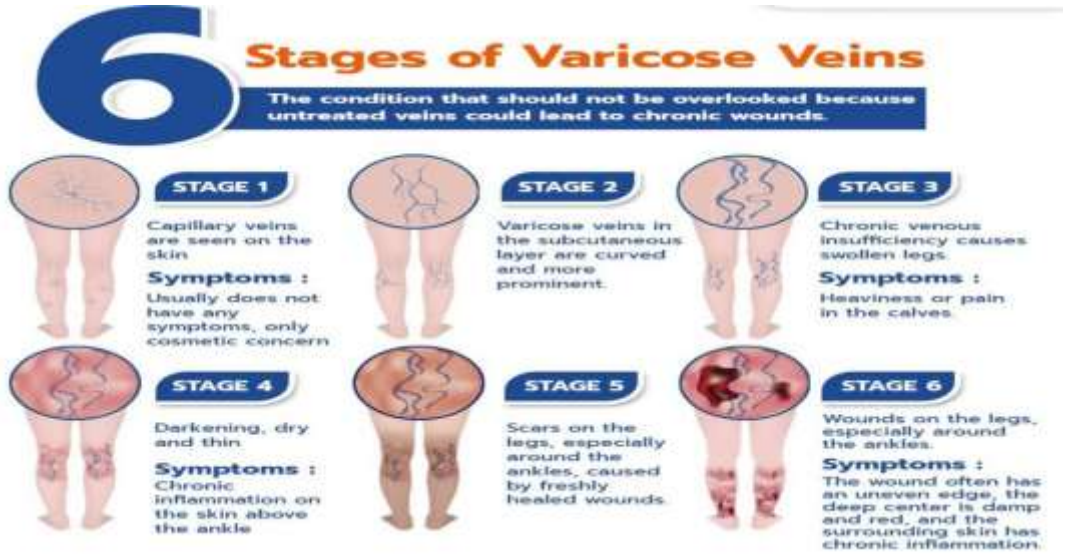

Figure 1:stages involved in varicose vein

IV.CAUSES OF VARICOSE VEIN

Varicose vein can be inherited, secondary or primary in origin.

1. Principal vein varicosities

Varicose veins are inherited and affect some members of the same family. They are caused by an inherent weakness in the wall.

2. Secondary varicose vein

Deep vein thrombosis or traumas are the secondary causes of varicose vein development.

3. Famillial and congenital varicose

It caused by abnormalities in the venous system's normal development, resulting from limb vascular malfunctions from birth, known as Klippel-Trenaunay syndrome.

V. SIGNS AND SYMPTOMS

1. **Vein appearance-** enlarged, twisted, lumpy.
2. **Bleeding-**Even a small injury to the affected area can cause continuous or prolonged bleeding**.**
3. **Swelling-**Occur in one leg. It is commonly seen along with large varicose vein, although is not a frequent symptom and may also be caused by other medical condition**.**
4. **Eczema-**The skin over the affected area may become red, dry, itchy and irritated.
5. **Atrophie blanche** -irregular white patches that resembles scars are commonly seen around the ankle area.
6. **Lipodermatosclerosis**-The skin near the ankles may become tight and hardened due to thickening of the fat layer underneath.
7. **Restless legs syndrome**-This condition makes the legs feel heavy, numb or sometimes burning, along with an urge to move them.
8. **Pain**-A dull, aching discomfort that becomes more intense after prolonged standing or sitting.

Table 1: Distribution of Clinical Signs and Symptoms Associated with Varicose Veins

Signs and symptoms	**NO**	**%**
Pain	42	52.5
Dilated vein	68	85
Ulceration	20	25
Skin changes	38	47.5
Edema of limb	22	27.5

Risk factors

1.Obesity- When a person is overweight its lead to increase the vein pressure.

2. Family history-The likelihood of developing varicose veins increase if close relatives also have the condition.

3.Age- As individuals grow older, blood tends to pool in the veins because the valves that regulate circulation gradually weaken.

Table 2: Age-wise Distribution of Individuals Affected by Varicose Veins

Age distribution (in years)	NO	Percentage
10-20	0	0
21-30	6	7.5
31-40	12	15
41-50	32	40
51-60	21	26.25
>60	9	11.25

4.Sex-women are at greater risk, mainly due to hormonal changes that relax the vein walls. The risk increase during menstruation, pregnancy, menopause and with the use of hormonal treatments such as oral contraceptives.

5.Extended standing or sitting-Inactivity can reduce blood flow and aggravate varicose vein.

6.Pregnancy-During pregnancy the veins in the leg may enlarge because of the increased blood volume in the body.

VI. DIAGNOSIS OF VARICOSE VEIN

The diagnosis of varicose veins is primarily based on clinical evaluation combined with appropriate imaging techniques. Initially, a detailed medical history and physical examination are performed to assess symptoms such as visible dilated veins, limb heaviness, pain, swelling, and skin changes around the affected area. Physical examination is usually conducted with the patient in a standing position to clearly observe the distended superficial veins and identify areas of venous insufficiency. In addition to clinical observation, several diagnostic tests may be used to confirm the condition and determine the severity of venous dysfunction. Among these, Doppler ultrasonography is considered the most reliable and widely used non-invasive method for evaluating venous blood flow, detecting reflux, and identifying venous obstruction. In some cases, additional imaging techniques such as duplex ultrasound scanning, venography, or magnetic resonance venography may be employed to provide a more detailed assessment of the venous system. These diagnostic procedures help clinicians determine the extent of venous valve incompetence and guide appropriate treatment strategies for managing varicose veins effectively[1,2,13,14.]

VII.TREATMENT OF VARICOSE VEIN[11,15,16]

1. **Life style changes**: exercise, weight control, leg elevation, avoiding long standing/sitting, and compression stockings help reduce symptoms.
2. **Sclerotherapy:** Injection of a solution into a vein to shrink and close them.
3. **Vein stripping & ligation:** Surgical removal or tying off of large damaged veins.
4. **Ambulatory phlebectomy:** Small incisions are made to remove surface varicose veins.
5. **Endoscopic vein surgery:** A tiny camera helps in closing or removing severe affected veins.
6. **RFA &Laser therapy:** Heat-based methods that close unhealthy veins with quicker recovery.
7. **Endovenous ablation:** Heat or laser is used to seal faulty veins under local anesthesia.

VIII. HERBAL PLANTS USED IN VARICOSE VEIN[17,18,19]

1.Achillea millefolium (Yarrow – leaf/flower) is traditionally used for improving blood circulation and reducing inflammation in venous disorders.

2.Aesculus hippocastanum (Horse chestnut – seed) contains escin, which strengthens vein walls and decreases swelling associated with varicose veins.

3.Allium sativum (Garlic – bulb) helps improve blood flow and reduces clot formation through its sulfur-containing compounds.

4.Aloe vera (leaf gel) exhibits anti-inflammatory and wound-healing properties that support skin and vascular health.

5.Andrographis paniculata (leaf) shows antioxidant and anti-inflammatory effects that may help protect vascular tissues.

6.Apium graveolens (Celery – seed) is known for its mild diuretic action that helps reduce fluid accumulation in tissues.

7.Arnica montana (flower) is widely used to reduce swelling, bruising, and pain in inflamed veins.

8.Asparagus racemosus (root) contains saponins that support vascular tone and improve circulation.

9.Azadirachta indica (Neem – leaf) provides antimicrobial and anti-inflammatory actions beneficial for skin conditions around varicose veins.

10.Bacopa monnieri (whole plant) possesses antioxidant properties that protect blood vessels from oxidative stress.

11.Berberis aristata (root bark) contains berberine that exhibits anti-inflammatory and antimicrobial activity.

12.Boerhavia diffusa (root) helps decrease edema due to its diuretic and anti-inflammatory effects.

13.Calendula officinalis (flower) promotes wound healing and reduces skin irritation in venous ulcers.

14.Camellia sinensis (green tea – leaf) contains polyphenols that strengthen vascular integrity and reduce oxidative damage.

15.Capsicum annuum (fruit) improves circulation by stimulating blood flow in peripheral vessels.

16.Cassia fistula (fruit pulp) contains antioxidant compounds that support vascular health.

17.Centella asiatica (whole plant) enhances collagen synthesis and strengthens vein walls.

18.Cinnamomum verum (bark) improves blood circulation and reduces inflammation through its bioactive compounds.

19.Citrus limon (fruit peel) provides flavonoids that help maintain capillary strength.

20.Curcuma longa (turmeric – rhizome) reduces inflammation and oxidative stress in vascular tissues.

21.Cymbopogon citratus (lemongrass – leaf) has anti-inflammatory and antioxidant properties.

22.Daucus carota (carrot – root) contains carotenoids that support vascular and skin health.

23.Eclipta alba (whole plant) exhibits anti-inflammatory and hepatoprotective effects beneficial for circulation.
24.Eucalyptus globulus (leaf) contains essential oils that reduce inflammation and microbial growth.
25.Foeniculum vulgare (fennel – seed) improves digestion and circulation through its phytochemicals.
26.Ginkgo biloba (leaf) enhances blood circulation and improves vascular elasticity.
27.Glycyrrhiza glabra (licorice – root) shows anti-inflammatory and antioxidant activity.
28.Hibiscus rosa-sinensis (flower) contains antioxidants that help protect blood vessels.
29.Hypericum perforatum (St. John's wort – aerial parts) is used for wound healing and inflammation reduction.
30.Ipomoea batatas (sweet potato – root) provides antioxidants that support vascular health.
31.Justicia adhatoda (leaf) contains alkaloids with anti-inflammatory properties.
32.Linum usitatissimum (flaxseed – seed) provides omega-3 fatty acids that reduce inflammation and improve vascular function.
33.Mangifera indica (mango – leaf) contains polyphenols that act as antioxidants.
34.Matricaria chamomilla (chamomile – flower) soothes inflammation and supports healing of skin tissues.
35.Mentha piperita (peppermint – leaf) improves circulation and provides a cooling anti-inflammatory effect.
36.Moringa oleifera (leaf) contains flavonoids and vitamins beneficial for vascular health.
37.Nigella sativa (black seed) possesses antioxidant and anti-inflammatory effects.
38.Ocimum sanctum (holy basil – leaf) supports circulation and reduces oxidative stress.
39.Papaver somniferum (seed) contains compounds that may help reduce inflammation.
40.Passiflora incarnata (passionflower – aerial parts) helps relieve discomfort associated with venous problems.
41.Phyllanthus emblica (amla – fruit) provides vitamin C which strengthens connective tissues in veins.
42.Piper nigrum (black pepper – fruit) enhances circulation and absorption of nutrients.
43.Plantago major (leaf) supports wound healing and reduces inflammation.
44.Punica granatum (pomegranate – fruit) contains polyphenols that improve vascular function.
45.Ricinus communis (castor – seed) is traditionally used for anti-inflammatory effects.
46.Rosa damascena (rose – flower) has antioxidant properties that benefit skin and vessels.
47.Rosmarinus officinalis (rosemary – leaf) improves circulation and reduces inflammation.
48.Salvia officinalis (sage – leaf) provides antimicrobial and antioxidant effects.
49.Santalum album (sandalwood – wood) helps soothe inflamed skin tissues.
50.Smilax china (root) has anti-inflammatory and detoxifying properties.
51.Syzygium cumini (jamun – seed) contains polyphenols beneficial for vascular health.
52.Tamarindus indica (fruit pulp) provides antioxidants that help reduce oxidative stress.
53.Taraxacum officinale (dandelion – root) acts as a mild diuretic that reduces edema.
54.Terminalia arjuna (bark) strengthens cardiovascular and vascular systems.
55.Terminalia chebula (fruit) provides tannins with antioxidant effects.
56.Tinospora cordifolia (stem) enhances immunity and reduces inflammation.
57.Trifolium pratense (red clover – flower) contains isoflavones beneficial for circulation.
58.Trigonella foenum-graecum (fenugreek – seed) improves blood circulation and reduces inflammation.
59.Urtica dioica (nettle – leaf) helps reduce swelling and supports circulation.
60.Valeriana officinalis (root) assists in relieving discomfort and inflammation..
61.Citrullus lanatus (watermelon – fruit) provides lycopene and antioxidants that reduce vascular inflammation and oxidative stress.
62.Origanum vulgare (oregano – leaf) contains carvacrol and thymol that show antimicrobial and anti-inflammatory actions.
63.Litchi chinensis (lychee – fruit) provides polyphenols and vitamin C that protect vein collagen.
64.Embelia ribes (false black pepper – fruit) shows antiplatelet and antioxidant activities.
65.Musa paradisiaca (plantain – fruit) offers antioxidants that may support circulation and reduce swelling.
66.Aloe barbadensis (tea – leaf) contains catechins that stabilize endothelial function.
67.Momordica charantia (bitter gourd – fruit) improves vascular dilation through nitric oxide pathways.
68.Gymnema sylvestre (flax – seed) supplies omega-3 fatty acids and lignans that improve endothelial health.
69.Emblica officinalis (fenugreek – seed) supports circulation and reduces inflammation.
70.Beta vulgaris (beetroot – root) produces nitric oxide that widens blood vessels and improves circulation.
71.Annona squamosa (custard apple – leaf) contains alkaloids with anti-inflammatory activity.
72.Avena sativa (oats – seed) provides beta-glucans that improve lipid profile and vascular health.
73.Boesenbergia rotunda (carrot – root) supplies antioxidants that support vascular integrity.
74.Oryza sativa (rice – bran) contains phenolic compounds that protect endothelial tissues.
75.Prunus avium (sweet cherry – fruit) provides anthocyanins that improve circulation.
76.Spinacia oleracea (spinach – leaf) contains vitamin K and antioxidants that strengthen capillaries.
77.Phoenix dactylifera (date – fruit) contains flavonoids that protect vein walls from oxidative damage.
78.Lavandula angustifolia (lavender – flower) provides anti-inflammatory and soothing effects.
79.Malus domestica (apple – fruit) contains quercetin and polyphenols that support vascular health.

80.Coriandrum sativum (coriander – seed) exhibits antioxidant and vasodilatory properties.
81.Brassica oleracea (cabbage – leaf) helps reduce swelling and inflammation when used as a compress.
82.Ocimum basilicum (sweet basil – leaf) contains flavonoids and essential oils that protect veins from oxidative stress.
83.Vitis vinifera (Grape – seed/fruit) contains proanthocyanidins and flavonoids that enhance venous tone and protect blood vessels from oxidative damage.
84.Punica protopunica (Wild pomegranate – fruit) provides polyphenolic compounds with antioxidant activity that help maintain vascular health.
85.Camellia japonica (Flower/leaf) contains flavonoids and phenolic constituents that contribute to improved circulation and vascular protection.
86.Olea europaea (Olive – leaf) is rich in oleuropein and other phenolic compounds that improve vascular elasticity and reduce inflammation.
87.Zingiber officinale (Ginger – rhizome) promotes blood circulation and exhibits anti-inflammatory properties beneficial for vascular disorders.
88.Curcuma zedoaria (White turmeric – rhizome) contains curcuminoids and essential oils that demonstrate antioxidant and anti-inflammatory effects.
89.Piper longum (Long pepper – fruit) improves peripheral circulation and possesses anti-inflammatory bioactive constituents.
90.Elettaria cardamomum (Cardamom – seed) contains volatile oils and antioxidants that support cardiovascular and circulatory health.
91.Syzygium aromaticum (Clove – flower bud) is rich in eugenol which exhibits strong antioxidant and anti-inflammatory properties.
92.Lawsonia inermis (Henna – leaf) provides antimicrobial and anti-inflammatory effects that may benefit skin conditions associated with venous disorders.
93.Withania somnifera (Ashwagandha – root) contains withanolides that reduce oxidative stress and support vascular health.
94.Nardostachys jatamansi (Rhizome) exhibits antioxidant and anti-inflammatory properties that contribute to improved circulation.
95.Picrorhiza kurroa (Root/rhizome) is known for its antioxidant and hepatoprotective activities that indirectly support vascular health.
96.Bergenia ciliata (Rhizome) contains bioactive compounds with anti-inflammatory and antioxidant properties.
97. Costus speciosus (Rhizome) exhibits anti-inflammatory and pharmacological properties beneficial for circulatory disorders.
98.Alpinia galanga (Rhizome) contains flavonoids and essential oils that improve circulation and reduce inflammation.
99.Acorus calamus (Rhizome) demonstrates antioxidant and anti-inflammatory activity that may support vascular protection.
100.Plumbago zeylanica (Root) contains plumbagin, a compound known for antimicrobial, anti-inflammatory, and antioxidant effects.

IX. CONCLUSION

One hundred medicinal plants were selected for the treatment of varicose veins. The information was gathered from standard research journals, pharmacopoeias, Materia medica, ethnopharmacological sources, and the Ayurvedic Pharmacopoeia. This review article will be very helpful for young researchers working on varicose veins.Varicose veins are a challenging disorder that mainly affects middle-aged and obese individuals. The condition affects women more commonly than men. As pharmacy graduates, we have decided to develop a novel herbal formulation for the treatment of varicose veins. Therefore, we are searching for medicinal plants that can be used to treat this condition.

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