

## AWARENESS OF VARICOSE VEINS IN EARLY ADULTHOOD-A CROSS-SECTIONAL STUDY

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### ABSTRACT

**Background:** Varicose veins (VVs) are a common manifestation of chronic venous disease, characterized by the winding and expansion of superficial veins in the lower legs, commonly accompanied by pain, heaviness, itching, swelling, and pulsating discomfort<sup>25</sup>. Varicose veins are twisted; dilated veins most commonly located on the lower extremities.

**Objective:** Aim of the study for awareness of varicose veins in early adulthood in the Ahmedabad and Mahemdavad districts of Gujarat, India.

**Methods:** A survey of varicose vein in the Mahemdavad and Ahmedabad districts of Gujarat, India, was conducted from 16th April 2025 to 5th July 2025. Participants completed a two-part Google e-survey, accessible online via a link distributed through social media and email.

**Results:** Out of 4,900 participants, 323 completed the survey (6.5% response rate, 95% CI, 5.3% margin of error). The majority of respondents were female (55.70%) and between the ages of 18 and 30 (76%, 180 out of 323). The result obtained in this survey were analyzed using basic statistics through Microsoft Excel and inbuilt Google form calculation.

**Conclusion:** A significant lack of awareness regarding varicose veins among young adults. The findings indicate that most participants possess limited knowledge about the causes, symptoms, and potential complications of the condition. While many could recognize the most common symptom visible, twisted veins they were largely unaware of other signs, such as aching, heaviness, or swelling in the legs.

**Keywords:** Adulthood, Varicose Veins, Sclerotherapy, Physiotherapy, Pneumatic Compression.

### INTRODUCTION

The venous system of the lower limbs consists of two channels: one within the muscular system, and one superficial to it. The principal deep veins are the femoral and popliteal veins, which begin in the foot as the plantar digital vein. These contain one-way valves every few centimeters. The purpose of the one-way valves is to direct blood flow toward the

heart. About 90% of all venous blood leaves the leg by the deep veins through the action of muscular compression. This system has been termed the calf-pump or peripheral heart<sup>1</sup>.

The deep venous system is connected through multiple channels to other more superficial veins; thus, many alternate routes are available for blood to

return to the heart even after blockage of the femoral vein. These more superficial veins also provide venous return from the cutaneous and subcutaneous systems again through the action of one-way valves<sup>2</sup>.

The most prominent superficial vein is the great/long saphenous vein. This vein begins along the medial aspect of the great toe with the dorsal venous arch. It passes anterior to the medial malleolus and crosses the tibia obliquely, continuing along the medial aspect of the tibia and across the medial and anterior thigh to empty into the femoral vein. Some other prominent and consistent superficial veins are the accessory saphenous vein, which runs from the lateral knee to the saphenofemoral junction; the anterior vein of the leg, which runs from the lower lateral calf to the medial knee; and the lesser (short) saphenous vein, which begins at the lateral aspect of the little toe, ascending posterior to the lateral malleolus, up the calf between the gastrocnemius heads, to the popliteal fossa, ending in the popliteal or great saphenous veins. Unlike the preceding simplified description, connections between the superficial and deep venous systems are varied<sup>3</sup>.

In addition, there are many unnamed tributaries of the saphenous vein that may become dilated and tortuous through an increase in venous pressure. These reticular or connecting branch veins may also become varicose. Consequently, differentiating them from the major venous system is critical when planning treatment. The deep fascia serves to contain the high-pressure calf-muscle pump. The superficial fascia covers the saphenous trunk<sup>4</sup>.

The tributaries of the saphenous veins are superficial to this fascia and not within its support. Thus, tributaries of the great saphenous vein are usually more grossly dilated than the great saphenous vein itself, even when proximal etiologic factors are producing the varicosity<sup>5</sup>.

A classification of varicose veins should be based on an anatomic and subsequent therapeutic evaluation of the venous system. The first anatomic classification was proposed by Heyerdale and Stalker in 1941<sup>6</sup>.

At rest, in the erect position, the pressure in the saphenous vein is primarily derived by that of a column of blood from the right atrium to the site of measurement of the leg (about 120 mm Hg at the ankle). With muscular activity, the pressure in the

normal saphenous vein at the level of the malleoli falls 45-68 mm Hg below the resting level<sup>16</sup> and is reduced from 80 to 40 mm Hg in the posterior tibial vein<sup>7</sup>. Due to the one-way valvular system in these veins, blood flow is thus directed from the superficial venous system to the deep venous system via communicating or perforating vessels (which also contain one-way valves). The venous blood then flows towards the heart.

In the prone position, blood flows evenly along all vessels—superficial and deep—toward the heart, propelled by the relatively small blood flow coming through the capillaries and a respiration induced sucking of blood into the abdominal and thoracic veins<sup>8</sup>. In contrast to deep veins, the superficial veins have been shown to have smooth muscle in their walls. This allows for contraction of those vessels in response to stimuli such as cold, drugs and dilation in response to topical and systemic alcohol, estrogen, and light physical trauma<sup>9</sup>.

A part of the pathophysiology of varicose veins may therefore occur by a diminished response of this smooth muscle contraction<sup>10</sup>. Irrespective of the cause, chronic venous hypertension in the lower extremities produces an increase in venous diameter, leading to valvular insufficiency. This results in a reversal of blood flow to the superficial venous system through incompetent communicating veins. The direction of venous flow in varicose veins has been examined by McPheeeters and Rice with fluoroscopy. Fortunately, this reversal of flow is beneficial during sclerotherapy treatment, since the superficial venous flow is forced distally to the smaller branching veins, where it will be arrested. Embolus formation is thereby prevented<sup>11</sup>. The superficial veins respond to increased pressure by dilating to accommodate the increased blood flow. Valvular incompetence occurs and varicosities appear<sup>12</sup>.

In addition, with movement of the lower limbs, the high venous pressure that normally occurs within the calf is transmitted straight to the superficial veins and subcutaneous tissues drained by these communicating veins<sup>13,14</sup>.

The venous pressure in the cuticular venules may reach 100 mm Hg in the erect position. This causes venular dilation over the whole area and results in capillary dilation, increased permeability and an increased blood volume in the subcutaneous capillary bed<sup>15,16,17,18</sup>.

A special situation occurs at the medial malleolus. In this area, the perforating veins are not surrounded by deep or significant superficial fascia. Therefore, the increased deep venous pressure is directly transmitted through the perforating vein to its superficial connecting vein<sup>19</sup>. This leads to high cutaneous pressures with a resulting transudation of extracellular fluid<sup>20</sup>. This has been shown to lead to perivascular fibrin deposition, which probably plays a significant role in decreased oxygenation of cutaneous and supporting tissues, thereby leading to cutaneous ulceration<sup>21,22</sup>. The effect of temperature on the venous system is well known. Recently, strain gauge venous occlusion plethysmography has confirmed an increase in venous distensibility associated with temperature elevation<sup>23</sup>.

The term varicose vein defines those veins that are abnormally large and tortuous. This term applies to both the large protruding veins within the superficial subcutaneous fascia and the smaller "spider veins" that occur just beneath the epidermis. The pathophysiology of varicose veins can be divided into four categories that may overlap with one another: increased deep venous pressure, primary valvular incompetence, secondary valvular incompetence, and fascial weakness<sup>24</sup>.

Varicose veins (VVs) are a common manifestation of chronic venous disease, characterized by the winding and expansion of superficial veins in the lower legs, commonly accompanied by pain, heaviness, itching, swelling, and pulsating discomfort<sup>25</sup>. Varicose veins are twisted; dilated veins most commonly located on the lower extremities. The exact pathophysiology is debated, but it involves a genetic predisposition, incompetent valves, weakened vascular walls, and increased intravenous pressure<sup>26</sup>. They can occur in other parts of the body and are blue or dark purple in colour with a lumpy, swollen, or otherwise unattractive appearance. This is one of the world's most frequent peripheral vascular disorders. Varicose veins are not painful in the early stages<sup>27</sup>.

Primary varicose veins (PVVs) are chronic venous diseases (CVDs) caused by the loss of venous wall homeostasis; of these, the great saphenous veins account for 70%<sup>28</sup>. They serve as indicators of underlying venous insufficiency, a condition characterized by impaired blood circulation back to the heart. This insufficiency arises due to malfunctioning valves within the affected veins,

leading to inefficient blood pumping, retrograde blood flow, and heightened pressure within the veins. While some individuals with varicose veins may remain asymptomatic, others experience localized discomfort, including aching, throbbing, or itching around the affected veins<sup>29</sup>.

In developing countries, the prevalence of VVs is lower than that in developed countries. In Western nations, the prevalence of VVs is 10%–15% in males and 20%–25% in females<sup>30</sup>. They affect 10–20% of population in the Western world but in India, it is 5%<sup>31</sup>. The epidemiological statistics indicate that about 25% of adults worldwide have (Primary varicose veins)PVVs, and women have a higher prevalence compared with men<sup>32</sup>.

The etiology of VVs is not clearly known at present, exacerbating factors have been identified<sup>33</sup>. Symptoms of varicose veins include a heavy, achy feeling and an itching or burning sensation; these symptoms worsen with prolonged standing. Hence, prolonged period of standing over a period of time makes them prone to Chronic venous diseases (CVI), hence varicose veins<sup>34</sup>. Prolonged standing and advancing age are considered to be the important factors for the development of varicose vein<sup>35</sup>. General risk factors are increasing age, belonging to the female sex, family history of venous diseases, pregnancy, smoking, and overweight. Prolonged working in a standing position increases the prevalence of VVs and is an important occupational risk factor<sup>36</sup>.

Varicose veins can be classified as trunk, reticular, or telangiectasia. Telangiectasia is also referred to as spider veins, star bursts, thread veins, or matted veins. Most varicose veins are primary; only the minority are secondary to conditions such as deep vein thrombosis and occlusion, pelvic tumours, or arteriovenous fistulae<sup>37</sup>. Therefore, there is a need to increase the awareness and educate the teaching faculties regarding varicose veins to maintain a good quality of life<sup>38</sup>.

**Role of Exercise** Prolonged sitting and standing is to be avoided. The patient is advised to do exercises of legs in elevated position. The legs are to be elevated and then in elevated position of legs some simple exercises like ankle and toe movements are to be done. The walk for 1-2 miles a day is with support of elastic stockings. Elevation of legs at 60- 70 degrees is advised and also while sleeping, legs are to be elevated by keeping the two or three pillows

under them. Static cycles can be used for cycling at homes. Swimming is also a good form of exercise to strengthen the leg muscles. Pendular exercises of legs are also advised in work places. All these exercises improve the flow of the blood. Tens, ultrasound and cycling helps in recuperating the blood circulation and help in relieving the pain. Resisted exercises with therabands helps in strengthening the muscles of legs. Elastic stockings are also effective; it maintains constant pressure and helps in improving the blood circulation<sup>39</sup>.

Varicose veins can be treated conservatively with compression therapy, lifestyle changes, leg elevation, weight control, and medication, or more interventionally with laser thermal ablation, endovenous therapies, and surgery. With better results and fewer complications, endovenous thermal ablation (EVTA) has virtually supplanted surgery as the usual procedure. Although compression therapy might be necessary for insurance considerations, current research and guidelines indicate that it is not necessary before contemplating EVTA. Despite their effectiveness, surgical techniques such as vein stripping and ligation have a greater rate of complications and need more time to recover from. When it comes to treating varicose veins, new endovenous treatments such as endovenous laser ablation (EVLA), radiofrequency ablation (RFA), steam vein sclerosis (SVS), and endovenous microwave ablation (EMWA) have shown results that are on par with surgery. Crucially, they provide fewer complications and quicker recuperation periods, which contributes to their growing popularity. Second-line therapy is ultrasound-guided foam sclerotherapy (UGFS). It might not, however, be as effective over the long run as EVTA techniques like EVLA and RFA, especially when thick-walled veins are involved. However, UGFS is the best option in certain situations, such as thin-walled or small-diameter veins, where it can be beneficial. All things considered, the management of varicose veins has been greatly enhanced by these developments in treatment options<sup>40</sup>.

The surgical options are 41:

1. Stripping and ligation of the great saphenous vein
2. Varicose vein ligation
3. Phlebectomy
4. Endovenous vein obliteration
5. Perforator vein surgery

Sclerotherapy shows greater benefits than surgery in the short term but surgery has greater benefits in the longer term. Varicose veins are a relatively common problem. Two treatments available are surgery and sclerotherapy. Both involve removal of the vein either by stripping it out or by injecting it with a solution that causes it to collapse and be absorbed into the surrounding tissues (sclerotherapy)<sup>42</sup>.

The saphenous venous system is commonly affected by varices. Removal of diseased veins is still the standard surgical method. Great saphenous vein (GSV) stripping and ligation of the sapheno-femoral junction (SFJ) has been the most commonly performed operation for varicose veins (VV)<sup>43</sup>.

## AIM OF THE STUDY

The main goal of a cross-sectional study on the awareness of varicose veins in early adulthood is to gauge the current level of knowledge among young people about this common condition. This research seeks to do more than just see if they've heard of it; it aims to understand their awareness of its symptoms, risk factors, and available treatment options. By identifying specific knowledge gaps and common misconceptions, the study can pinpoint where public health campaigns need to focus, ultimately helping to inform and educate a demographic that is often unaware of the condition's risks and preventative measures.

## MATERIAL AND METHODS

A survey of varicose veins in the Mahemdavad and Ahmedabad districts of Gujarat, India, was conducted from 16th April 2025 to 5th July 2025. Participants completed a two-part Google e-survey, accessible online via a link distributed through social media and email. The first section collected demographic information, while the second contained a varicose vein related questionnaire. Participation was voluntary and confidential, as communicated to all participants. Because the collected data posed no risk of harm, Ethical Review Board certification was deemed unnecessary.

This survey (Annexure Table 1) explored varicose vein experiences and knowledge. Questions 1-10 gathered demographic and background information, including varicose vein, pain sensations, problem related to walking and ADLs. Questions 11-13 treatment regarding varicose vein. Finally, questions 14-17 assessed awareness of and willingness to use

physiotherapy. Data analysis, using basic statistics (counts and percentages), was performed with Microsoft Excel and inbuilt Google Form calculations.

## RESULTS AND DISCUSSION

A total of 323 participants out of 4900 participants (response rate 6.5%; CI 95%; margin of error 5.3 %) completed the survey. The maximum response in this survey was from female participants in the age group of 18 to 30 which was 76% as shown in figure 4.1. Figure 4.2 shows that 55.70% of participants were females. Question 1 was designed to understand which type of sensation felt by participants. Mostly, the participants felt 28.50% of other type of pain in their limb which is shown in figure 4.3. Questions 2 and 3 were designed to understand the when did participant notice the vein-related discomfort and any problems with their daily living activities. As shown in figure 4.4 only 58.20 % participants were unsure for notice that pain discomfort first time and figure 4.5 mentioned that only 31.6% participants were having problems in ADLs. Questions 4 was for get an idea about worsened condition of participants related to their veins. Figure 4.6 shows that only 23.5% participants having worsened their condition recently. Question 5, 6, 6A and 6B. were for get an idea about relieving their pain by elevating limb, participants using compression hose, how-long and pain reduction by using hose. Figure 4.7 shows 41.5% participants have relieve their pain by elevating limb. Only 21.4% participants wearing of compression hose which is shown in figure 4.8. Question 7 was for have any participants had bleeding with their leg veins? Figure 4.11 shows only 9% participants having bleeding with their leg veins. Question 8 was for participants having any problem with walking which shown by figure 4.12 which was about 26%. Question 9 and 10 were for get an idea about does participants had any evaluation and tests regarding varicose veins? Figure 4.13 and 4.14 shows that only 15.8% had done evaluation and 9% had done tests regarding their varicose veins. Question 11 was for does participants had done with sclerotherapy vein injection? Figure 4.15 shows that only 3.7% participants had done with sclerotherapy vein injection. Questions 13 to 16 for how many participants have idea about physiotherapy and different types of physiotherapy management protocol for varicose vein. Figure 4.17 it is clearly suggested that 76.2% of participants have an idea about physiotherapy but very less percentage of

participants were aware about different types of physiotherapy management protocol for varicose vein. Thus, it is clear through this survey that there is predominance of varicose vein in pre-adulthood and they cannot share their varicose vein related problem easily. Also, they are not aware with the rehabilitation protocols which can address their varicose vein related problem.

To improve circulation, Buerger's exercises were implemented in different positions of lower limb, in which gravity would assist blood flow. Ideally, 720 repetitions of ankle-toe movements are needed regularly to prevent stasis. Their protocol focused on performing 810 repetitions daily. This leads to the effective functioning of collateral circulation to prevent stasis. Studies have demonstrated that exercising enhances microvascular endothelial function, resulting in increased venous flow. Blood flow acceleration was due to muscular contractions that squeeze intermuscular veins and intramuscular venous networks. A coordinated chain of muscular pumps was sequentially activated during walking, and respectively, activating the plantar, calf, thigh, and gluteal pumps. Hence, toe walking and heel raises have shown effect<sup>44</sup>.

Pneumatic compression was generally a painless and non-invasive technique with proven efficacy as a valuable adjunct in the management of patients with venous, lymphatic, and arterial disease. Pneumatic compression increases the velocity of venous return and reduces the amount of blood inside the veins<sup>45</sup>.

## CONCLUSION

Limitation of this study was relatively less sample size which can have statistical impact on the outcomes of the study. Also, in order to get maximum responses from the known sample area the survey was kept short and simple and we had no control over the participants responses which can lead to selection bias and majority of the survey participants were pre-adulthood females. Through this survey we came to know that majority of the participants are facing issues related to varicose veins, spider veins especially during daily living activities. Majority of participants are aware about the role of physiotherapy in managing their pain but have limited knowledge of advance rehabilitation protocols. Thus, we conclude that this cross-sectional study revealed a significant lack of awareness regarding varicose veins among young adults. The findings indicate that most participants

possess limited knowledge about the causes, symptoms, and potential complications of the condition. While many could recognize the most common symptom visible, twisted veins they were largely unaware of other signs, such as aching, heaviness, or swelling in the legs.

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## REFERENCES

1. Pollack AA, Wood EH. Venous pressure in the saphenous vein at the ankle in man during exercise and changes in posture. *J Appl Physiol* 1649, 1949
2. Braverman IM, Keh-Yen A. Ultrastructure of the human dermal microcirculation. IV. Valve-containing collecting veins at the dermal-subcutaneous junction. *J Invest Dermatol* 81:43W42, 1983.
3. Raivio EVL. Untersuchungen die Venen der unteren Extremitäten mit besonderer Bevückgichtigung der gegenseitigen Verbindungen zwischen den oberflächlichen und tiefen Venen. *Ann Med Exp Fenn* 25(Suppl.):1, 1948
4. Kubik S. Anatomie der Beinvenen. In Wupperman (ed): *Varizen ulcus cruris und Thrombose*. Berlin, SpringerVerlag, 1986, pp 1-54.
5. Miller SS. Investigation and management of varicose veins. *Ann Royal Col Surg Eng* 55:245-252, 1974
6. Heyerdale WW, Stalker LK. The management of varicose veins of the lower extremities. *Ann Surg* 114:1042-1049, 1941.
7. Arnoldi CC. Venous pressure in the leg of healthy human subjects at rest and during muscular exercise in the nearly erect position. *Acta Chir Scand* 130:570-583, 1965.
8. Dodd H, Cockett FB. *The Pathology and Surgery of the Veins of the Lower Limb*. Edinburgh, Churchill Livingstone, 1976.
9. Lange L, Echt M. Comparative studies on drugs which increase venous tone using noradrenaline, ethyl-andrianol, dihydroergotamine and horsechestnut extract. *Fortschr Med* 90:1161-1164, 1972
10. Mellander S, Nordenfelt L. Comparative effects of dihydroergotamine and noradrenaline on resistance, exchange and capacitance functions in the peripheral circulation. *Clin Sci* 39:183-201, 1970
11. McPheeters HO, Rice CO. Varicose veins-The circulation and direction of venous flow. *Surg Gynecol Obst* 49:29-33, 1929
12. Farber EM, Bates EE. Pathologic physiology of stasis dermatitis. *Arch Dermatol* 70:653-661, 1954
13. Negus D, Friedgood A. The effective management of venous ulceration. *Br J Surg* 70:623-627, 1983
14. Cockett FB, Jones BE. The ankle blow-out syndrome: A new approach to the varicose ulcer problem. *Lancet* 1:17-23, 1953
15. Landis EM. Factors controlling the movement of fluid through the human capillary wall. *J Biol Med* 5:201-225, 1933.
16. Burland KG, Clemenson G, Whimster I, et al. The effect of sustained venous hypertension on the skin capillaries of the canine hind limb. *Br J Surg* 69:41-44, 1982.
17. Ryan TJ, Wilkinson DS. Diseases of the veins-Venous ulcers. In Rook A et al. (eds): *Textbook of Dermatology*, 3rd Ed. London, Blackwell Scientific Publications, 1979.
18. Ryan TJ. Diseases of the skin: Management of varicose ulcers and eczema. *Br Med J* 1:192-194, 1974
19. Ryan TJ. Diseases of the skin: Management of varicose ulcers and eczema. *Br Med J* 1:192-194, 1974.
20. Whimster I. In Dodd H, Cockett FB (eds): *The Pathology and Surgery of the Veins of the Lower Limb*. Edinburgh, Churchill Livingstone, 1976.
21. Falanga V, Moosa HH, Nemeth AJ, et al. Dermal pericapillary fibrin in venous disease and venous ulceration. *Arch Dermatol* 123:620-623, 1987
22. Lotti T, Fabbri P, Panconesi E. The pathogenesis of venous ulcers. *J Am Acad Dermatol* 16:877-878, 1987.

23. Shepherd JT, Vanhoutte PM. Role of the venous system in circulatory control. Mayo Clin Proc 53:247-255, 1978
24. Boccalon H, Ginestet MC. Influence of temperature variations on venous return: Clinical observations. Phlebology 3(Suppl. 1):47-49, 1988
25. Abdullah Dalboh, Nawaf Amer Alshehri , Abdulmajeed Abdullah Alrafie , Khalid Ali Bakri . Prevalence and awareness of varicose veins among teachers in Abha, Saudi Arabia. 2020 Sep 30;9(9):4784-4787.
26. Jacqueline Raetz, Md, Megan Wilson, Md, And Kimberly Collins, Md Varicose Veins: Diagnosis and Treatment Am Fam Physician. 2019;99(11):682-688
27. Leena R. Baghdadi,Ghadah F. Alshalan, Norah I. Alyahya, Hend H. Ramadan,Abrar M. Alshahrani,Jumana A. Alqahtani,Maha O. Aljarbaa , Prevalence of Varicose Veins and Its Risk Factors among Nurses Working at King Khalid University Hospital Riyadh, Saudi Arabia: A Cross-Sectional Study, Published: 16 December 2023
28. Xuan Ni MPH,RN , Qinghong Huang RN, Liping Tan MPH, RN , The impact of lack of disease awareness on the experience of primary varicose veins, Volume 37, Issue 4, December2019,https://www.sciencedirect.com/science/article/abs/pii/S1062030319301190.
29. Faris Fayyaz , Viralkumar Vaghani , Chukwuyem Ekhator , Muhammad Abdullah , Rashed A. Alsubari , Omar A. Daher , Danyal Bakht , Hanen Batat , Hareem Arif , Sophia B. Bellegarde , Pakeezah Bisharat , Muhayya Faizullah, Advancements in Varicose Vein Treatment: Anatomy, Pathophysiology, Minimally Invasive Techniques, Sclerotherapy, Patient Satisfaction, and Future Directions, Published01/10/2024.
30. Qian Li , Xiaotao Wang , Bin Meng , Xinle Chen , Mingmin Xu, Patient perceptions and preferences of minimally invasive treatment modalities in varicose veins: a cross-sectional survey. Front Cardiovasc Med. 2024Apr25.
31. Mishra, Siddharth; Ali, Iqbal; Singh, Gurjot, A study of epidemiological factors and clinical profile of primary varicose veins, Medical Journal of Dr. D.Y. Patil University 9(5):p 617-621, Sep–Oct 2016.
32. Xuan Ni MPH,RN , Qinghong Huang RN , Liping Tan MPH, RN .The impact of lack of disease awareness on the experience of primary varicose veins. Journal of Vascular Nursing Volume 37, Issue 4, December 2019, Pages 257-263.
33. Myeong-Ja Yun , Young-Ki Kim , Dong-Mug Kang , Jong-Eun Kim , Won-Choon Ha , Kap-Yeol Jung , Hyun-Woo Choi . A Study on Prevalence and Risk Factors for Varicose Veins in Nurses at a University Hospital. Saf Health Work. 2018 Mar;9(1):79-83. doi: 10.1016/j.shaw.2017.08.005. Epub 2017 Aug 24.
34. Jacqueline Raetz, Md, Megan Wilson, Md, And Kimberly Collins, Md. Varicose Veins: Diagnosis and Treatment Am Fam Physician. 2019;99(11):682-688.
35. Dalboh, Abdullah; Alshehri, Nawaf Amer; Alrafie, Abdulmajeed Abdullah; Bakri, Khalid Ali Prevalence and awareness of varicose veins among teachers in Abha, Saudi Arabia. Journal of Family Medicine and Primary Care 9(9):p 4784-4787, September2020.
36. Myeong-Ja Yun , Young-Ki Kim , Dong-Mug Kang , Jong-Eun Kim , Won-Choon Ha , Kapyeol Jung , Hyun-Woo Choi. A Study on Prevalence and Risk Factors for Varicose Veins in Nurses at a University Hospital. Safety and Health at Work Volume 9, Issue 1, March 2018, Pages 79-83.
37. Nick J M London,Roddy Nash, Varicose veins. Published 20 May 2000.
38. Abdullah Dalboh , Nawaf Amer Alshehri , Abdulmajeed Abdullah Alrafie , Khalid Ali Bakri. Prevalence and awareness of varicose veins among teachers in Abha, Saudi Arabia. J Family Med Prim Care 2020 Sep 30;9(9):4784-4787.
39. Dr. Rekha Mahajan, Preventing Varicose Veins: Role of Exercise, Diet and Physiotherapy. Vol. 5, No. 05; 2021.
40. Faris Fayyaz , Viralkumar Vaghani , Chukwuyem Ekhator , Muhammad Abdullah , Rashed A. Alsubari , Omar A. Daher , Danyal Bakht , Hanen Batat , Hareem Arif , Sophia B. Bellegarde , Pakeezah Bisharat , Muhayya Faizullah. Advancements in Varicose Vein Treatment: Anatomy, Pathophysiology, Minimally Invasive Techniques, Sclerotherapy, Patient Satisfaction, and Future Directions. Published 01/10/2024.
41. Michael Ombrellino , Lowell S Kabnick. Varicose Vein Surgery. Semin Intervent Radiol. 2005 Sep;22(3):185–194. https://pmc.ncbi.nlm.nih.gov/articles/PMC3036286/

42. Kathryn A Rigby, Simon J Palfreyman, Catherine Beverley, Jonathan A Michaels. Surgery versus sclerotherapy for the treatment of varicose veins. Version published: 18 October-2004 .
43. L Blomgren , G Johansson, A Dahlberg-AKerman, A Norén, C Brundin, E Nordström, D Bergqvist . Recurrent varicose veins: incidence, risk factors and groin anatomy. Eur J Vasc Endovasc Surg 2004 Mar;27(3):269-74.
44. Caggiati A, De Maeseneer M, Cavezzi A, Mosti G, Morrison N. Rehabilitation of patients with venous diseases of the lower limbs: State of the art. Phlebology 2018;33:663-71.
45. Comerota A, Aziz F: The case for intermittent pneumatic compression. Clinical review. J Lymphoedema, 2009, 4: 57–64.

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