



## STUDY ON CLINICAL PROFILE, SURGICAL MANAGEMENT AND FUNCTIONAL OUTCOME OF VARICOSE VEINS OF LOWER LIMB

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### ABSTRACT

**Background:** Varicose veins, affecting 5% of Indians, are dilated, tortuous veins caused by pregnancy, obesity, genetic predisposition, and COVID-19. Diagnostic methods include Doppler ultrasound and duplex imaging. **Objectives:** To evaluate risk factors for varicose vein disease, assess surgical outcomes post-stripping and ligation, and evaluate management strategies for complications. **Methods:** A study at Chirayu Medical College and Hospital in Bhopal, India, involved 77 patients with varicose veins, analyzing pain, cramps, and complications, and examining comorbidities, risk factors, and disease presentation. Data collection socio-demographic data through interviews and questionnaires, and clinically examined cases to analyze their distribution, associations with comorbidities, risk factors, presentation, and disease presentation. Routine investigations and DUPLEX Ultrasound Radiological investigations were performed. **Results:** Total 77 patients with varicose veins, with a majority of males (84.42%) and females (15.58%). The majority were in the 41-50 age group, with a higher proportion of males. Clinical complaints included dilated veins and pain, with ulcers rare. Patients were mostly agricultural, labor, and sales workers, with alcohol consumption being the most common addiction. Most patients had a BMI between 18.5 and 22.9 kg/m<sup>2</sup>, indicating they fell within the normal weight range. Hypertension was diagnosed in 12.5%. Varicose veins were more prevalent on the left and right side, with bilateral involvement being less common. Symptom duration was 13-24 months, with symptom durations lasting ≤6 months, 7-12 months, and >36 months being less common. Treatment methods were Trendelenberg and stripping (53.25%), followed by compression therapy (24.68%). Postoperative complications were surgical site infection (6.49%), hematoma (2.60%), and neuritis and wound dehiscence (1.30% each). The majority of patients (70.69%) had a hospital stay of 6-10 days, with fewer patients staying ≤5 days (22.41%) or >10 days (6.90%). **Conclusion:** The study examines varicose veins in middle-aged men, highlighting minimal postoperative issues but prevalent surgical site infections, emphasizing the need for personalized treatment and efficient postoperative management.

**KEYWORDS :** Varicose veins, Lower Limb, Surgical Management, Hospital Stay

### INTRODUCTION

Varicose veins are dilated, tortuous veins under the skin, affecting 5% of the Indian population.[1,2] Factors contributing to their development include pregnancy, prolonged standing, obesity, advanced age, genetic predisposition, deep vein thrombosis, smoking, alcohol consumption, and COVID-19 infections.[3-5] The etiopathogenesis involves developmental anomalies in the superficial venous system or perforating veins. Patients with varicose veins may experience discomfort, edema, and skin discoloration. Problems associated with varicosis include bleeding, tibial deformities, tibial periostitis, lipodermatosclerosis, thrombophlebitis, and Marjolin's ulcer. The underlying mechanisms of the venous system and valvular dysfunction are recognized as contributing factors.<sup>[6,7]</sup>

Doppler ultrasound is the primary diagnostic tool for varicose veins, with its color-coded display and flow direction.<sup>[8]</sup> Duplex imaging, a form of vascular imaging, has significantly transformed this process, combining pulsed Doppler assessment with B-mode color flow imaging to detect flow direction, incompetence, and incompetent valves.<sup>[9]</sup> This imaging provides detailed insights into the morphology and functionality of venous valve cusps, making it a valuable tool for chronic venous insufficiency treatment.<sup>[10]</sup> Surgical interventions for varicose veins include Trendelenburg procedure, vein ligation and stripping, phlebectomies, and venous reconstructive surgeries. The research aims to evaluate the efficacy of commonly used procedures like vein ligation and stripping in postoperative patients with varicose veins, as well as the surgical outcomes and complications associated with these procedures, including wound infection, hematoma, pain, wound dehiscence, and saphenous vein neuritis, as well as their incidence and recurrence rates. The study aims to investigate the recurrence of laser stripping and ligation in varicose veins, focusing on clinical characteristics, commonly used conservative or surgical treatments, and their outcomes in previously treated patients. The research will use follow-up examinations, telephone interviews, or old patient records to analyze the effectiveness of less invasive procedures like endovenous thermal ablation, sclerotherapy, and ultrasound-guided foam sclerotherapy.<sup>[11]</sup> The study aims to improve treatment protocols and patient care by examining patient demographics, symptomatology, and surgical procedures' effectiveness. A comprehensive understanding of these factors will lead to the development of more sophisticated strategies, ultimately improving clinical outcomes and quality of life for those affected by varicose veins.

The study aims to analyze risk factors for varicose vein disease, evaluate surgical outcomes after stripping and ligation, and assess management strategies for complications.

### METHODS

The study was conducted at Department of General Surgery, Chirayu Medical College and Hospital in Bhopal, India over a period of one year. Total 77 patients with pain, heaviness, cramps, and complications such as edema, brawny indurations, pigmentation, dermatitis, ulceration, superficial thrombophlebitis, and large varicosities with potential trauma and cosmetic concern. Written informed consent was obtained and confidentiality was maintained. The study excluded patients with arterio Venous malformation, malignancy, pregnancy, uncontrolled diabetes mellitus, myocardial infarction, and congenital disease.

The study focuses on new cases of varicose veins in patients attending a department or inpatient. The socio demographic data is collected through interviews and case sheets are entered into a predesigned questionnaire. All cases are clinically examined to analyze their distribution, associations with comorbidities, risk factors, presentation, and presentation of the disease. Routine investigations are performed, and DUPLEX Ultrasound Radiological investigations are performed. The appropriate management is offered based on severity, comorbidities, and aesthetic concerns. The choice of surgery is determined based on severity, comorbidities, and aesthetic concerns. Postoperatively, patients who underwent Ligation and Stripping are monitored for complications and outcomes. Regular monthly follow-ups are conducted until the end of the study period. Old patients or patients on conservative management are also reviewed, along with previous case histories and operational sheets. The study was approved by an ethical committee and maintained patient confidentiality. Data was collected using Microsoft Office tools and summarized using descriptive statistics. The measures included number (n), percentage (%), and mean ± standard deviation (SD), which indicate the variability or dispersion of the data around the mean. The study was conducted without any financial burden to the patient or institute.

### RESULTS

Total 77 people with varicose veins, with the majority being in the 41-50 age group. The gender distribution is male, with 65 patients (84.42%) and 12 women (15.58%). The most common complaint is

dilated veins, followed by pain. The most common occupation is agriculture, followed by labor and sales.

The distribution of addiction types is smoking, chewing tobacco, alcohol, and both alcohol and smoking. Alcohol consumption is the most common addiction, followed by tobacco chewing. The combination of alcohol and smoking is the least common addiction.

The majority of patients (61 patients, 79.22%) have a BMI between 18.5 and 22.9 kg/m<sup>2</sup>, indicating they fall within the normal weight range. A smaller proportion (12.99%) have a BMI between 23.0 and 24.9 kg/m<sup>2</sup>, classifying them as overweight. Only 7.79% have a BMI of 25 kg/m<sup>2</sup> or higher, placing them in the obese category.

The distribution of affected segments is long saphenous vein, with 58 people having involvement of the long saphenous vein, followed by short saphenous vein and both long and short saphenous veins. The laterality of varicose veins is left (42 people), right (24 people), and bilateral (B/L) (14.29%), with the latter being less common. Overall, varicose veins are most common on the left side of the body, followed by the right side.(Table 1)

**Table 1:** Distribution of patients according to demographic and clinical profile

		n	%
Age	≤20 years	8	10.39
	21-30 years	11	14.29
	31-40 years	12	15.58
	41-50 years	25	32.47
	51-60 years	12	15.58
	>60 years	9	11.69
	Total	77	100.00
Gender	Male	65	84.42
	Female	12	15.58
BMI	18.5-22.9 kg/m <sup>2</sup>	61	79.22
	23.0-24.9 kg/m <sup>2</sup>	10	12.99
	≥25 kg/m <sup>2</sup>	6	7.79
	Total	77	79.22
OCCUPATION	Farmer	15	19.48
	House Wife	12	15.58
	Labour	13	16.88
	Sales	14	18.18
	Security Guard	6	7.79
	Student	11	14.29
	Teacher	4	5.19
	Ex-Military	2	2.60
	ADDICTION	Smoking	11
Tobacco Chewer		14	18.18
Alcohol		15	19.48
Alcohol And Smoking		4	5.19
Alcohol And Tobacco Chewer		5	6.49
Hypertension	Yes	12	15.58
	No	65	84.42
PRESENTING COMPLAINTS	Dilated Veins	64	83.12
	Odema Of Limb	14	18.18
	Pain	33	42.86
	Skin Changes	21	27.27
	Ulcer	7	9.09
SEGMENT INVOLVED	Long Saphaneous	58	75.33
	Short Saphenous	3	3.90
	Long Saphenous + Short Saphenous	16	20.78
LATERALITY	Left	42	54.55
	Right	24	31.17
	B/L	11	14.29

The majority of patients with varicose vein surgery have a combination of Sapheno Femoral Incompetence and multiple levels of perforator incompetence, with the most common pathology being Sapheno Femoral Incompetence. This is followed by Above Ankle Perforator Incompetence, followed by Below Knee Perforator Incompetence, and finally Sapheno Popliteal Incompetence. The frequency of different pathologies is highest in Sapheno Femoral Incompetence and Sapheno Popliteal Incompetence, followed by Sapheno Femoral Incompetence and Sapheno Popliteal Incompetence. The least common pathologies are Sapheno Femoral Incompetence and Sapheno Popliteal Incompetence. This highlights the importance of understanding the different pathologies and their prevalence during varicose vein surgeries.(Table 2)

**Table2:** Distribution of patient according to different pathology

PATHOLOGY in varicose veins surgery	n	%
Above Ankle Perforator Incompetence	3	3.90
Above Knee + Below Knee Perforator Incompetence	9	11.69
Below Knee Perforator Incompetence	7	9.09
Below + Above Ankle Perforator Incompetence	6	7.79
Sapheno Femoral Incompetence	15	19.48
Sapheno Femoral Incompetence + Above Ankle Perforator Incompetence	3	3.90
Sapheno Femoral Incompetence + Below Knee Perforator	8	10.39
Sapheno Femoral Incompetence + Below Knee Perforator Incompetence + Below Knee Perforator Incompetence	20	25.97
Sapheno Femoral Incompetence + Above Ankle Perforator Incompetence	1	1.30
Sapheno Femoral Incompetence + Sapheno Popliteal Incompetence	1	1.30
Sapheno Femoral Incompetence + Sapheno Popliteal Incompetence +Below Knee Perforator Incompetence	1	1.30
Sapheno Femoral Incompetence +Above Knee Perforator + Below Knee Perforator Incompetence	1	1.30
Sapheno Femoral Incompetence+Below Knee Perforator Incompetence + Above Ankle Perforator Incompetence	1	1.30
Sapheno Femoral Incompetence + Sapheno Popliteal Incompetence + Below Knee Perforator Incompetence + Above Ankle Perforator Incompetence	1	1.30
Sapheno Popliteal Incompetence+Above Knee + Below Knee Perforator Incompetence	1	1.30

The majority of people with varicose veins experience symptoms for a duration of 13-24 months. Symptoms are most common for those with symptoms lasting 6 months or less, followed by those with symptoms lasting 7-12 months, followed by those with symptoms lasting 13-24 months, followed by those with symptoms lasting 25-36 months, and finally those with symptoms lasting more than 36 months. Symptoms lasting longer than 36 months are also rare. The study analyzed the treatment strategies for varicose veins, with 19 individuals undergoing compression therapy, 53.25% undergoing Trendelenberg and stripping, and 3.90% undergoing stitch detachment. 8 people underwent Trendelenberg and stripping with subfascial ligation, 10.39% undergoing ligation and stripping of the sapheno-popliteal junction, and 3.90% undergoing Trendelenberg and stripping + ligation of the sapheno-popliteal junction. Additionally, 1 person underwent Trendelenberg and stripping and a phlebectomy, accounting for 1.30% of the total number. These treatments were used to treat varicose veins. (Table 3)

**Table 3:** Distribution of patients according to different duration of symptoms and management

	n	%	
DURATION OF SYMPTOMS	≤6 months	15	19.48
	7-12 months	13	16.88
	13-24 month	20	25.97
	25-36 months	16	20.78
	>36 months	13	16.88
MANAGEMENT	Compression therapy	19	24.68
	Trendelenberg and stripping	41	53.25

Trendelenberg and stripping and stab avulsion	3	3.90
Trendelenberg and stripping and subfascial ligation	8	10.39
Sapheno popliteal junction ligation and stripping	2	2.60
Trendelenberg and stripping + sapheno popliteal junction ligation	3	3.90
Trendelenberg and stripping and phlebectomy	1	1.30

Varicose vein surgery results in a significant number of complications, with hematoma being the most common postoperative complication, followed by neuritis. Despite surgical site infection being the most common, it is the most common complication. Treatment strategies for these complications include evacuation and compression of the hematoma, conservative treatment and multivitamins, and dressings and antibiotics. Evacuation involves surgically removing accumulated blood and applying compression to minimize bleeding and promote healing. Neuritis is treated with rest, avoiding aggravated activities, and taking a multivitamin to support nerve health and recovery. For surgical site infection and wound dehiscence, sterile dressings and antibiotics are used to prevent further contamination and ensure proper healing. (Table 4)

**Table 4:** Distribution of patients according to different post-surgery complications

		n	%
Post-surgery complications (n=58)	Haematoma	2	2.60
	Neuritis	1	1.30
	Surgical Site Infection	5	6.49
	Wound Dehiscence	1	1.30

The majority of people undergoing varicose vein surgery have a hospital stay of 6 to 10 days, with a smaller proportion requiring fewer or more days. The distribution shows that 22.41% of patients stay for 5 days or less, 70.69% stay for 6 to 10 days, and 6.90% stay for more than 10 days.(Table 5)

**Table 5:** Distribution of patients according to different length of hospital stay (in days)

		n	%
Length of hospital stay (in days)	≤5 days	13	22.41
	6-10 days	41	70.69
	>10 days	4	6.90

**DISCUSSION**

Varicose veins are a common medical condition that often presents in early childhood and progresses without noticeable symptoms. Although not directly causing death, they are associated with significant health problems, such as discomfort, inflammation, and a sensation of heaviness in the lower limbs. Venous hypertension is a primary concern, leading to complications such as Chronic Venous Insufficiency (CVI), venous ulcers, venous ulcers on ankles, phlebitis, and deep vein thrombosis (DVT). These conditions can cause discomfort and serious consequences, and their management involves a combination of conservative and surgical approaches tailored to the severity of the condition. Despite their less prevalent nature, varicose veins can heighten the risk of thrombosis in deeper veins. Varicose veins can be treated with conservative methods like compression therapy, lifestyle changes, surgical intervention like sclerotherapy, laser surgery, vein stripping and ligation, or endovenous ablation therapy. These treatments aim to improve blood circulation, relieve symptoms, and prevent progression. However, untreated varicose veins can cause significant pain and problems, making timely detection and treatment crucial for their wellbeing.

The study reveals that the majority of participants are aged 41-50, accounting for 32.47% of the total. The age groups of 31-40 and 51-60 years make up 15.58% of the participants. The age groups of ≤20 years and >60 years have the lowest representation. This aligns with previous research, which found that 40% of varicose veins cases were observed in individuals aged 41-50.[12] Other studies, including those from India and McGuckin et al., also found that most variceal cases occur within this age range.[13-15]

The study reveals a significant correlation between age and the

prevalence of varicose veins, with a higher incidence observed in males (84.42%). This finding is consistent with previous research, including Rao and Pusphalatha's (2020) study, which found a higher prevalence rate among males.[12] This is likely due to work-related risk factors. However, previous studies have shown a greater percentage of cases among female patients, with the study's findings consistent with these findings. The variation in findings can be attributed to differences in study participants' characteristics, locations, and lifestyle factors, which impact the occurrence of varicose veins. The study's findings are consistent with previous research, suggesting that work-related risk factors may contribute to the higher prevalence of varicose veins in males.[9,13,16] The study's findings can be attributed to variations in demographics across different regions.[13]

The study found that varicose veins present with various symptoms, with enlarged veins being the most prevalent, affecting 83.12% of patients. Limb edema was observed in 18.18% of cases, pain in 42.86%, skin lesions in 27.27%, and ulceration in 9.09%. Pain was more common than ulceration, with 56.5% of patients experiencing pain.[17-19] Limb edema was lower in the study population (18.18%) compared to other studies. Additional symptoms such as leg heaviness (53.5%), cramps (53.5%), lipodermatosclerosis (39%), superficial thrombophlebitis (33.5%), cellulitis (12.5%), and bleeding (9.1%) were not as prevalent in the study population. Skin lesions were higher in the UK (2.5% lipodermatosclerosis) than in Malaysia (22% eczema).[19] Skin itching was reported in 20% of participants, lower than 26% in a Finnish study.[17,20] The presence of skin disorders like eczema and lipodermatosclerosis, as well as symptoms like pain and ulceration, emphasizes the importance of early diagnosis and comprehensive care to prevent complications. Moisturizing and managing skin changes, especially around the medial malleolus, can help prevent ulcers and infections.[9,20]

The study analyzed 77 patients with varicose veins, revealing that most fell within the normal weight range, with a significant proportion being overweight or obese. Out of these patients, 12.99% had a BMI between 23.0 and 24.9 kg/m<sup>2</sup>, while 7.79% had a BMI of 25 kg/m<sup>2</sup> or higher. This suggests a varied distribution of BMI among individuals with diabetic foot ulcers (DFUs). Out of the 77 patients, 15.58% were diagnosed with hypertension, while the remaining 65 (84.42%) did not have hypertension.

The study contributes to understanding varicose vein symptoms, emphasizing the importance of tailored management strategies based on symptom severity and patient demographics. Agriculture was the most common occupation among varicose vein patients, followed by labor and sales. Ex-military occupation was the least represented. Alcohol intake was the predominant addiction, with tobacco chewing being the second most prevalent. The co-occurrence of alcohol use and smoking was the least prevalent addiction.[3,12]

The findings align with previous research, but there is limited data available on the impact of alcohol and coffee use, as well as nutritional variables such as changes in vitamin and mineral levels due to food intake, on varicose veins.

The study found that the long saphenous vein was involved in 75.33% of cases, while the short saphenous vein was affected in 3.90% of cases. A total of 16.78% of cases involved both veins. This distribution of varicose veins primarily affects the long saphenous vein, with a secondary involvement of other veins. Perforator insufficiency was observed in 30% of patients below the knee, 27.5% above the ankle, 20% in the thigh, and 8.75% in unspecified areas.

The study also found no correlation between smoking, alcohol consumption, and varicose veins. A recent study by Yuan et al (2021) found no significant link between hereditary alcohol consumption and the development of varicose veins.[21] The distribution of involvement of the great saphenous vein in varicose veins aligns with academic literature. The most frequently affected vein is the long saphenous vein, followed by a combination of long and short veins, and less commonly, only the short vein or the long vein.

The study focused on the laterality of varicose veins, finding that varicose veins tend to affect the left side of the body more frequently, followed by the right side, while bilateral involvement is less prevalent. The findings contrast with the study by Rao & Pusphalatha et al. (2020), which reported that the right limb was impacted in 60% of

cases, the left limb in 25%, and bilateral involvement in 15% of cases.[12]

The study reveals a higher incidence of left limb involvement in varicose veins, possibly due to colon positioning and anatomical differences. Varicose veins are more common on the left side of the body, with symptoms lasting 13-24 months. Short-term symptoms are less prevalent, and symptoms persisting for more than 36 months are rare. Varicose vein therapy difficulties include Sapheno Femoral Incompetence (SFI) and multiple perforator incompetence. SFI, involving perforators below the knee and above the ankle, is the most frequent pathology, causing 25.97% of cases. Venous reflux and superficial vein pressure result from sapheno-femoral junction valve dysfunction in SFI, which increases varicose veins and chronic venous insufficiency. The findings highlight the importance of considering anatomical factors when assessing and managing this condition.[22]

The study examined various treatment modalities for varicose veins, with compression therapy being the most common. It involved 19 subjects, representing 24.68% of the total number. Trendelenberg and stripping procedures were performed in 41 people, accounting for 53.25% of the total number. Three patients underwent Trendelenberg and stripping with suture release, while eight patients underwent Trendelenberg and stripping with subfascial ligation. Two individuals underwent ligation and stripping of the sapheno-popliteal junction, while three underwent a combined procedure. Postoperative complications were observed in the study population, including hematomas, neuritis, surgical site infections, and wound dehiscence. Despite their low occurrence, surgical site infections were the most prevalent postoperative complication, followed by hematomas. The results underscore the importance of careful postoperative care and infection prevention measures to reduce complications and ensure positive outcomes after surgical procedures for varicose veins. A recent study by Rao & Puschalatha et al. (2020) found that wound infection emerged as the predominant postoperative complication in all surgically managed cases.[12] In this study, 41.25% of cases underwent Subfascial Ligation with stripping of the long saphenous vein (SSFL), which is frequently used in the surgical treatment of varicose veins to remove the affected vein while reducing complications and enhancing results. The study adhered to standard practices for managing postoperative complications.

Surgery and compression are common techniques used to minimize bleeding and promote healing in hematomas. Conservative treatment for neuritis without surgery includes rest, avoiding activities that worsen symptoms, and taking multivitamins to promote nerve health and healing. Supplementing with B vitamins can help maintain and restore nerve function. Treatment options for surgical site infection and wound dehiscence include antibiotics and dressings. Thorough wound cleaning and sterile dressing application are crucial to prevent contamination and facilitate healing. Antibiotics are prescribed to prevent or treat bacterial infections and promote wound healing. These treatment modalities aim to address specific issues while promoting optimal recovery and minimizing the risk of further complications. A study shows that most people undergoing varicose vein surgery have a hospital stay of 6 to 10 days, with a smaller proportion requiring fewer or more days in the hospital.[23]

The study explores the clinical profile, surgical management, and functional outcome of varicose veins in the lower limb, a common condition affecting quality of life and productivity. It helps clinicians choose optimal management strategies and evaluates functional outcomes post-surgery, contributing to improved patient care and potentially reducing recurrence rates and healthcare costs.

## CONCLUSION

The research explores the demographics, clinical symptoms, and outcomes of individuals with varicose veins, focusing on middle-aged men, agricultural occupations, and Trendelenberg and stripping processes. Postoperative issues were minimal, but surgical site infections were prevalent. The study highlights the need for personalized treatment and efficient postoperative management to prevent complications and reduce hospital stays.

## REFERENCES

1. McCollum P. Chapter I. Venous disorders. In: Bailey H, Love McN, editors. Bailey and Love's Short Practice of Surgery. 26th ed. Boca Raton, 2013.
2. Vipul Agarwal et al. Prevalence and risk factors of varicose veins, skin trophic changes, and venous symptoms among northern Indian population. International journal of medical science. SKHM govt medical college, Mewat. April 5 2013.
3. Carpentier PH, Maricq HR, Biro C, Makinen COP, Franco A. Prevalence, risk

- factors, and clinical patterns of chronic venous disorders of lower limbs. J Vasc Surg. 2004.
4. Beebe-Dimmer JL, Pfeifer JR, Engle JS, Schottenfeld D. The epidemiology of chronic venous insufficiency and varicose veins. Annals of epidemiology. 2005.
5. Pol Przegł Chir. Patients with chronic venous insufficiency in the times of COVID-19 and the risk of thrombus formation. department of phlebology, Poland. 2021 Apr 27
6. Irtzi P, Emmi S, Joshi C. Study of clinical features and management of varicose veins of lower limb. J Clin Diagn Res. 2011.
7. Julie A. Freischlag MD, Jennifer A. Heller MD. Sabiston textbook of surgery, 18th edition. Page 2002-2019.
8. Aparna Irodi & Shyamkumar N. Keshava & Sunil Agarwal & Ipeson P. Korah & David Sadhu. Ultrasound Doppler Evaluation of the Pattern of Involvement of Varicose Veins in Indian Patients. Indian J Surg. March–April 2011
9. Robertson L., Lee A.J., Gallagher K., Carmichael S.J., Evans C.J., McKinsty B.H. Risk factors for chronic ulceration in patients with varicose veins: a case control study. J. Vasc. Surg. 2009;49:1490–1498
10. Sir Alfred Cuschieri, Robert J.C. Steele, Abdool Rahim Moossa. Essential surgical practice, 4th edition. Page 879-923.
11. Ted I. Zegarra; Prasanna Tadi. CEAP classification of venous disease. Asram Medical College, Eluru, India. March 26, 2022
12. Rao BN, Puschalatha R.A clinical study on varicose veins of lower limb, surgical management and functional outcome at a tertiary care hospital of South India. Int Surg J2020;7:1051-5
13. Mishra S, Ali I, Singh G. A study of epidemiological factors and clinical profile of primary varicose veins. Med J DY Patil Univ. 2016;9:617-21.
14. McGuckin M, Waterman R, Brooks J, Cherry G, Porten L, Hurley S, et al. Validation of venous leg ulcer guidelines in the United States and United Kingdom. Am J Surg. 2002;183:132-7.
15. Lins E.M., Barros J.W., Appolonio F., Lima E.C., Junior M.B., Anacleto E. Epidemiologic profile of patients who underwent varicose vein surgery of the lower limbs. J. Vasc. Bras. 2012;11:301–304.
16. Sahu S., Bhushan S., Sachan P. Clinico-anatomical and radiological study of varicose veins of lower limb and their management outcomes. Internet J. Surg. 2012;28(2) <http://print.ispub.com/api/0/ispub-article/13926> Available from:
17. Barandiaran J, Hall T, El-Barghouti N., Perry E. Day case management of varicose veins. Vasc. Surg. Princ. Pract. 2012 <http://www.intechopen.com/books/vascular-surgery-principles-and-practice/day-case-management-of-varicose-veins> Available from:
18. AO Tonev, SG Genadiev, SG Dimitrov, TT Zahariev, GK Nachev. A retrospective study of 100 patients with varicose veins treated with radiofrequency ablation and stripping. Phlebology. 2013;20(3):150–154. <http://www.phlebology.org/a-retrospective-study-of-100-patients-with-varicose-veins-treated-with-radiofrequency-ablation-and-stripping/> Available from:
19. Murl N.L., Navin I.D. Classical varicose vein surgery in a diverse ethnic community. Med. J. Malays. 2008;63:193–198
20. Allen L. Assessment and management of patients with varicose veins. Nurs. Stand. 2009;23:49–57.
21. Yuan S, Bruzelius M, Damrauer SM, Larsson SC. Cardiometabolic, Lifestyle, and Nutritional Factors in Relation to Varicose Veins: A Mendelian Randomization Study. J Am Heart Assoc. 2021 Nov 2;10(21):e022286.
22. Labropoulos, N., Leon, L., & Bhatti, A. Development of reflux in the perforator veins after saphenous vein ablation. Journal of Vascular Surgery, 2005;42(5), 1156-1161.
23. Brittenden, J., Cooper, D., & Dimitrova, M. Ultrasound-guided foam sclerotherapy versus surgery for the treatment of varicose veins. New England Journal of Medicine, 2014;371(13), 1218-1227.