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PATTERN OF INVOLVEMENT OF VARICOSE VEINS BY COLOR DOPPLER

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ABSTRACT

Introduction: Varicose veins, which are easily identifiable, are veins in the subcutaneous tissues of the legs that are swollen, twisted, widening, twisting, and swelling. The inability of the valves to close properly usually results in blood reflux, which can induce symptoms of venous hypertension. The two saphenous junctions are generally considered to be the source of main varicose veins. These are the deep veins (small saphenous) in the legs and the superficial vein (bigger sephonous) that spreads retrogradely along the saphenous trunks to tributaries. Symptoms related to their lower limbs, including cramps, tingling, heaviness, swelling, and discomfort, pain, eczema.
Methodology: The terms "varicose veins in lower extremities","duplex ultrasonography of varicose veins," and "pathogenesis of varicose veins" were used in the search. This evaluation only includes studies that demonstrate the utility of Doppler US in diagnosing varicose vein involvement patterns. Out of all the publications we found, only eighteen meet the inclusion criteria to be included in this review article. Diversity

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across research was found. Probably as a result of advancements in US technology and diagnostic methods, the accuracy of US in determining the pattern of varicose vein involvement grew with time. Based on the examined study.

Objective: To evaluate the pattern of involvement of varicose veins by color Doppler.

Data analysis: Data was analyzed by IBM SPSS software version 26.

Conclusion: Our research topic is evaluation of pattern of involvement of varicose veins by color Doppler. The sample size of our study is 65 patients. We collected data from DHQ hospital, Madinah Teaching Hospital, Al Noor hospital. Out of which 47 were male and 18 were female. The most common cause of varicosities was long term standing occupations like, it effects mostly teachers, shopkeepers, bank managers, security guards. The effected veins were Great saphnous vein, Short saphnous vein and junctions were Saphnopopliteal, Saphnofemoral junction. The left leg was mostly effected than right leg and both legs were affected in fewer patients. There are different grades of reflux from grade I-IV occur in saphnopopliteal and saphnofemoral junction.

INTRODUCTION

Varicose veins, which are easily identifiable, are veins in the subcutaneous tissues of the legs that are swollen, twisted, widening, twisting, and swelling. The inability of the valves to close properly usually results in blood reflux, which can induce symptoms of venous hypertension. Many people think that varicose veins shouldn't need as much lead therapy because they are not medically serious. Varicose veins affect almost one- third of adults in Western countries, and most of them never cause any difficulties.There are significant concerns and cares involved, which are usually handled with careful reasoning and deliberation, or by a variety of currently available quick fixes.1

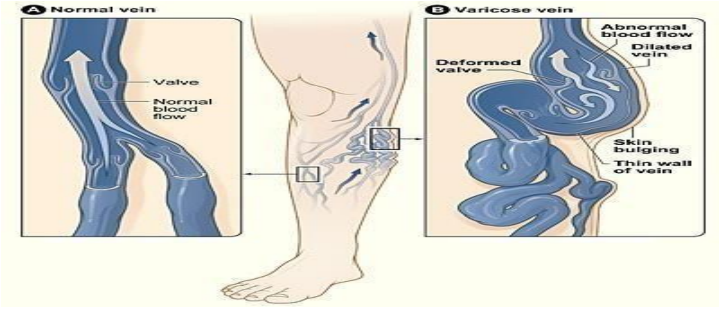
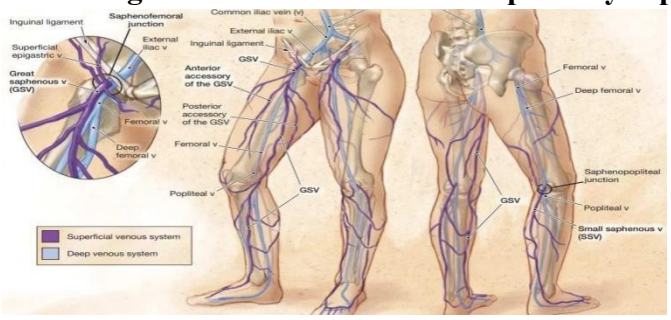


Fig 1: Varicose veins arise due to valvular incompetence, which causes the superficial venous system to enlarge. [2]

Varices is an illness that frequently affects the saphenous vein system[3]. The two saphenous junctions are generally considered to be the source of main varicose veins. These are the deep veins (small saphenous) in the legs and the superficial veinthat spreads retrogradely along the saphenous trunks to tributaries. Similar to thigh veins, varicose veins are located in similar places. Based on the perforators' anatomical locations in the leg's terminal region, there are five different categories The first are the calf's fifth muscular perforator, the middle facet of the lower limb, the lateral aspects of lower extremities, the short saphenous structure, and the second and third lateral aspects.[4]

Fig 2: Common configuration of the lower veins' primary superficial and deep veins.[5]



MATERIAL AND METHODS

A descriptive and cross sectional study design was applied in this study. This study was conducted in Madinah Teaching Hospital Faisalabad. Duration of this study was 4 months, sample size 65 patients.The sampling technique was Consective. Inclusion criteria of this study was pregnant women, obese patients, symptomatic and asymptomatic patients of varicose veins, individuals above age 15 and exclusion criteria was individuals under age 15,with acute venous disease.The equipment was duplex ultrasonography with linear array probe of 7.5-10 MHz

DATA COLLECTION PROCEDURE

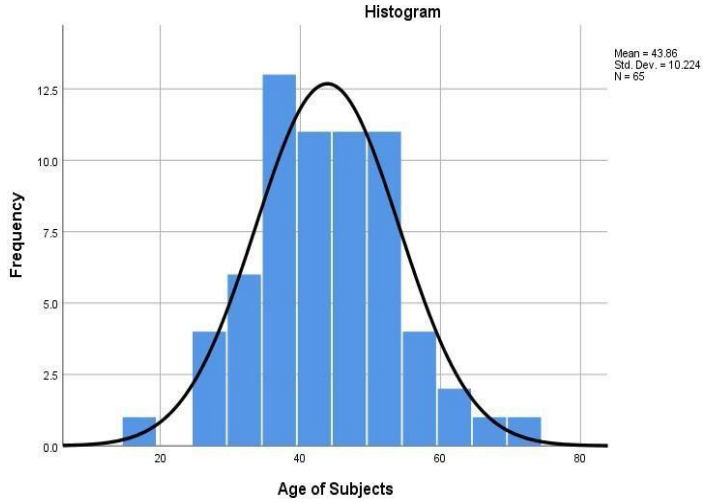
The study is based on pattern of involvement of varicose veins by using color Doppler. The study variables are the age of the patient, gender, prolonged standing, obesity, pregnancy and family history. Patients were evaluated on the basis of inclusion and exclusion criteria and consent was taken from each patient. All variables mentioned above for each patient would be recorded in the data collection sheet. History was taken from patients or their attendants. Before examination describe the whole procedure to the patients and guide them to wear loose, comfortable clothes to examine lower limb veins so that sonographer easily detects the blood supply of limbs. The patient was examine in supine or upright in posture. The patient's hips were externally rotated, abducted, and their knee was flexed to make it easier to reach the posterior tibial vein in the medial calf and the popliteal vein in the popliteal fossa. Foot should position on couch and examine dorsal venous arch and anterior tibial vein. In color Doppler systolic/diastolic ratio or pulstility index was measured to evaluate stenosis or abnormal flow in veins. Ultrasound gel should apply which was work as a coupling medium to replenish the air over the subject's skin and the transducer. The presence or absence of blood flow and vascular velocity were detected using a linear array transducer. The existence or absence of blood flow and vascular velocity were detected using a linear array transducer.[13]

RESULTS

Age of Subjects

Mean age of 65 subjects of study was 43.86±10.224. Minimum age reported was of 17 years and maximum age was of 72 years who had complaint of varicose veins.

Histogram of age of subjects



Above histogram is showing age distribution among subjects of study. A histogram is a visual depiction of how numerical data is spread out or distributed. The histogram displays the count of data points inside certain value ranges, referred to as bins. The x- axis represents the bins or spans of the data, while the y-axis represents the frequency of points of data inside each bin.

Distribution of Gender

Gender of Subjects	Frequency	Percent
Male	47	72.3
Female	18	27.7
Total	65	100.0

Analysis Of Pain Complaint In Subjects

Presenting Complaint of Pain	Frequency	Percent
No	12	18.5
Yes	53	81.5
Total	65	100.0

Majority of subjects have complaint of pain during inspection. Frequency distribution of pain variable have shown that 81.5% subjects had history of pain while 18.5% had no pain due to varicose veins.

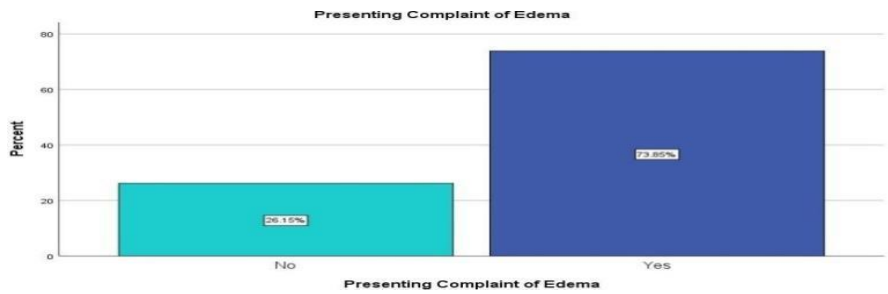
Analysis Of Eczema Complaint In Subjects

Presenting Complaint of Eczema	Frequency	Percent
No	32	49.2
Yes	33	50.8
Total	65	100.0

Frequency distribution of Eczema variable have shown that 50.8% subjects have complain of eczema while 49.2% had no eczema complain due to varicose veins.

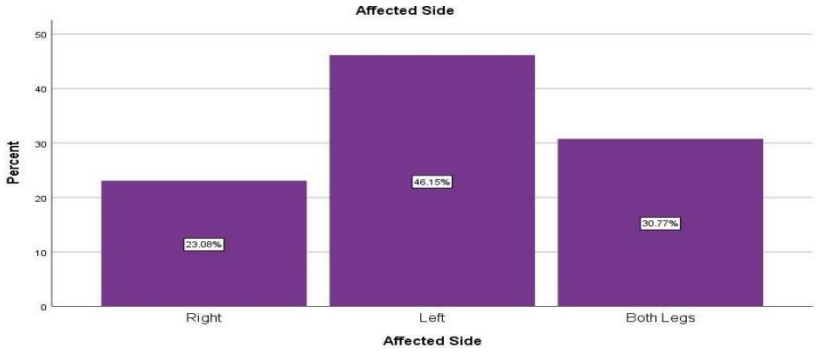
Analysis Of Edema Complaint In Subjects

Bar chart presentation of complaint of eczema



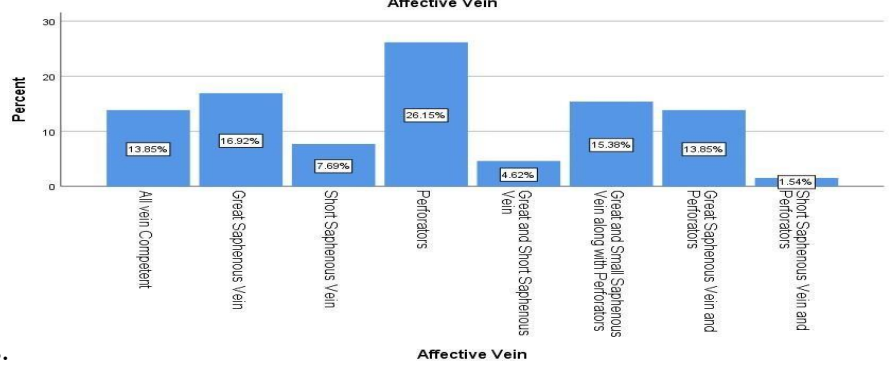
A bar chart depicting the frequency of edema complaints showcases the occurrence of edema among individuals, classified based on whether the edema is caused by varicose veins. The x-axis depicts the categories 'Yes' and 'No', while the y-axis displays the count of participants in each group. The graphic indicates that a significant number of individuals exhibit edema as a result of varicose veins, as seen by a higher bar in the 'Yes' group.

Evaluation Of Prevalence Of Affected Leg



To evaluate affective leg frequency was determined with percentage. 23.1% varicose veins was reported in right leg, 46.2% was prevalent in left leg, while 30.8% varicose veins effected both legs.

To evaluate prevalence of affected vein in individuals with varicose veins frequency distribution was performed. In 13.8% all vein were competent while in 16.9% only great saphenous vein was incompetent. 7.7% reported only short saphenous vein incompetency and in 26.2% perforators was incompetent. 4.6% have both great and short saphenous vein incompetent while 15.4% reported to have great and small saphenous vein incompetent along with incompetent perforators. In13.8% great saphenous vein and perforators or GSV associated perforators was incompetent. Whereas in 1.5% both short saphenous vein and perforators was incompetent leading towards occurrence of varicose veins.



Analysis Of Sapheno Femoral Junction

Sapheno femoral junction	Frequency	Percent
Incompetent	42	64.6
Competent	23	35.4
Total	65	100.0

In subjects with varicose veins 64.6 % have incompetent sapheno femoral junction, as it play important role in circulation of blood flow from legs back to body its incompetency increases chances of varicose veins. While 35.4% have competent sapheno femoral junction indicating other reason for occurrence of varicose veins.

Analysis of Sapheno Femoral Junction Reflux

Sapheno femoral junction Reflux[a]	Frequency	Percent
None	2	4.8
Grade I	7	16.7
Grade II	26	61.9
Grade III	6	14.3
Grade IV	1	2.4
Total	42	100.0
a. Sapheno femoral junction = Incompetent		

When Sapheno femoral junction valves become incompetent or fail to seal correctly, blood might backflow or reflux in the opposite direction towards the superficial veins rather than flowing effectively towards the heart. This regurgitation leads to elevated pressure inside the superficial veins, resulting in symptoms such as varicose veins, edema, and pain. There are different grade of reflux, about 16.7% grade I reflux was reported in subjects who have incompetent Sapheno femoral junction. 61.9% was of grade II and 14.3% of grade III and 2.4% reported grade was grade IV.

Analysis of Saphenopopliteal Junction

Saphenopopliteal junction	Frequency	Percent
Incompetent	29	44.6
Competent	36	55.4
Total	65	100.0

Saphenopopliteal Junction functions to regulate the circulation of blood and inhibit the occurrence of reflux, which refers to the backward movement of blood. In subjects with varicose veins 44.6% have incompetent saphenopopliteal Junction, meanwhile, 55.4% of individuals

possess a competent saphenopopliteal junction, suggesting that there must be another cause for the development of varicose veins.

Analysis Of Saphenopopliteal Junction Reflux

Saphenopopliteal junction Reflux[a]	Frequency	Percent
None	11	37.9
Grade I	10	34.5
Grade II	4	13.8
Grade III	1	3.4
Grade IV	3	10.3
Total	29	100.0
a. Saphenopopliteal junction = Incompetent		

About 34.5% grade I reflux was reported in subjects who have incompetent saphenopopliteal junction. 13.8% was of grade II and 3.4% of grade III and 10.3% reported grade was grade IV. While 37.9% incompetent saphenopopliteal junction does not exhibit reflux garde.

Discussions

The purpose of this research is to assess the color Doppler pattern of varicose vein involvement. Using a color doppler can assist in distinguishing varicose veins from other vascular diseases. The present challenge is comparing the results of a physical examination with the usefulness of color Doppler in varicose veins in order to determine the severity and vein dilation. As a result, it is possible to identify people who are more correctly at risk of acquiring more serious diseases. Dr. Souvik Patra, (2019) conducted a study on age group of 21- 80 years in Karnataka, India. Their sample size was 35 that showed the possible causes and patterns of venous valve competence include sapheno- femoral/sapheno-popliteal perforations, patency/thrombus in deep veins, and color doppler studies. According to the study, the most common risk factor was associated to long standing occupation such as in teachers (15%).[14] Our study investigated that out of 65 patients, teachers are more likely to develop varicose veins due to standing for long periods. It can cause blood to pool in the leg veins, increasing the pressure within the veins. In their study, teachers are more affected which was almost similar to our study.

Syed Amir Gillani (2017) conducted a systematic review on “The Significance of Doppler Ultrasound in the Causes of Varicose Veins”. According to the study, varicose veins can develop because of many reasons; some of the most important causes described in literature are SFJ incompetence, incompetency of the perforating veins.[15] This study aligns with the results of our study in a way that our study investigated 65 patients, 16.9% had great vein insufficiency and 7.7% had short vein incompetency.

Nicos Labropoulos (2020) conducted a systematic review on “Current Views on the Management of Incompetent Perforator Veins”. The study findings have significant implications on perforator veins are the cause of venous reflux and recurrent venous disease. This information was based on cross-sectional studies. The volume in the perforating veins is small and reflux as outward flow of >350 ms but for simplicity has

been accepted as >0.5 s similar to the superficial veins.[16]This study supports our study in a manner that prevalence of 26.2% have incompetent perforators.

S Chastanet (2020) proposed a retroprospective study on “Influence of the competence of the

sapheno-femoral junction on the mode of treatment of varicose veins by surgery". This study observed a sample size of 389 patients, out of which 189 (48.6%) patients have incompetent sapheno femoral junctions. The preoperative duplex ultrasound examination showed a GSV reflux in all cases. The SFJ was incompetent preoperatively in 189 LLs (48.6%). The mean preoperative SFJ diameter was 6.9 mm.[17] This study supported our study in a way that our (50%) showed a GSV reflux. As saphenofemoral junction valves become incompetent, blood might backflow in the opposit direction towards the superficial veins rather than flowing towards heart. This leads to elevated pressure inside superficial veins.

M.H. Kharrazi MD (2010) conducted a study on "Comparison of Doppler Ultrasonographic Findings in Complicated and Uncomplicated Lower-Limb Varicose Veins.". Almost 231 patients were involved in this study. He concluded that totally, 39 (13.5%) legs had incompetent deep valves (deep vein reflux), 117 (40.8%) had incompetent saphenofemoral valves (long saphenous vein reflux), 43 (14.9%) had incompetent saphenopopliteal valves (short saphenous vein reflux) and 144 (50.2%) had incompetent perforators (IPs). Chronic deep vein thrombosis (DVT) with segmental obstruction was detected in 26 legs (9.1%), incomplete compressibility in 76 legs (26.5%) and narrowing in 84 legs (29.3%).[18] On the other hand, our study had no prevalence of deep vein thrombosis.

Nazmiye Selçuk Kapısız(2014) conducted a study on "Potential Risk Factors for Varicose Veins with Superficial Venous Reflux." Forty-nine patients were enrolled for the study. He concluded that obesity and lack of physical activity were strongly associated with CVI in women, more so than in men. The number of pregnancies significantly distinguished between women with and without CVI. A modest association was found with female sex, previous injury in legs (DVT). According to our study, prevalence of men (72.3%) is
greater than that of women (27.7%)[19]. We did not evalute obesity as a main risk factor of developing the varicose veins.

CONCLUSION

Our research topic is evaluation of pattern of involvement of varicose veins by color Doppler. The sample size of our study is 65 patients. We collected data from DHQ, Madinah Teaching Hospital, Al Noor hospital. Out of which 47 were male and 18 were female. The most common cause of varicosities was long term standing occupations like, it effects mostly teachers, shopkeepers, bank managers, security guards. The effected veins were Great saphenous vein, Short saphenous vein and junctions were Saphenopopliteal, Saphenofemoral junction. The left leg was mostly effected than right leg and both legs were affected in fewer patients. There are different grades of reflux from grade I-IV occur in sapheenopopliteal and saphenofemoral junction.

RECOMMENDATIONS

- Further researches could be performed with large sample size. So, more generalized results can be generated.
- Further researches could add any other outcome measures for detailed understanding of pattern of involvement of varicose veins by color Doppler.

LIMITATIONS

It was difficult to carry out a research because complete publications were unavailable. Perhaps producing outcomes that are not full. Furthermore, the insufficient data on study locations hindered the investigation of further research questions and hypotheses which could have resulted in a narrowed comprehension of study.

References:

1. Campbell, B., Varicose veins and their management. Bmj, 2006. 333(7562): p. 287-292.
2. Hasa, R., et al., Varicose Veins during Pregnancy, Diagnosis and Treatment. ANGLISTICUM. Journal of the Association-Institute for English Language and American Studies, 2015. 4(2): p. 51-54
3. Blomgren, L., et al., Recurrent varicose veins: incidence, risk factors and groin anatomy. European Journal of Vascular and Endovascular Surgery, 2004. 27(3): p. 269-274
4. Hamdan, A., Management of varicose veins and venous insufficiency. Jama, 2012. 308(24): p. 2612-2621
5. Caggiati, A., et al., Age-related variations of varicose veins anatomy. Journal of vascular surgery, 2006. 44(6): p. 1291-1295
6. Aslam, M.R., et al., Global impact and contributing factors in varicose vein disease development. SAGE Open Medicine, 2022. 10: p. 20503121221118992.
7. Raetz, J., M. Wilson, and K. Collins, Varicose veins: diagnosis and treatment. American family physician, 2019. 99(11): p. 682-688.
8. Whiteley, M.S., Current best practice in the management of varicose veins. Clinical, Cosmetic and Investigational Dermatology, 2022: p. 567-583.
9. Bradbury, A., et al., What are the symptoms of varicose veins? Edinburgh vein study cross sectional population survey. Bmj, 1999. 318(7180): p. 353-356.
10. Marston, W.A. Evaluation of varicose veins: what do the clinical signs and symptoms reveal about the underlying disease and need for intervention? in Seminars in vascular surgery. 2010. Elsevier.
11. Feliciano, B.A. and M.C. Dalsing, Varicose vein: current management. Adv Surg, 2011. 45: p. 45-62.
12. a, G., Varicose veins. Circulation, 2014. 130(7): p. 582-587.Piazz
13. Patra S, Jacob AJ. Presentations, complications and approaches to varicose veins- a clinical study. IOSR J Dent Med Sci. 2019;18(2):62-7
14. Campbell, W.B., et al., Collecting data on treatments for varicose veins: Getting the focus right. 2017, SAGE Publications Sage UK: London, England. p. 224-226.
15. Gilani SA, Bacha R, Manzoor I. The significance of doppler ultrasound in the causes of varicose veins. Journal for Vascular Ultrasound. 2017 Dec;41(4):159-64.
16. Labropoulos N. Current views on the management of incompetent perforator veins. Annals of Phlebology. 2020 Apr 30;18(1):1-3.
17. Chastanet S, Pittaluga P. Influence of the competence of the sapheno-femoral junction on the mode of treatment of varicose veins by surgery. Phlebology. 2014 May;29(1_suppl):61-
18. Kharrazi MH, SANEI TM, Haghighatkhah HR, Ayoobi N, Dolatshahi M, Shakiba M. Comparison of Doppler Ultrasonographic Findings in Complicated and Uncomplicated Lower-Limb Varicose Veins.
19. Selçuk Kapısız N, Uzun Kulaoğlu T, Fen T, Kapısız HF. Potential risk factors for varicose veins with superficial venous reflux. International journal of vascular medicine. 2014;2014(1):531689.