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RISK FACTORS ASSOCIATED WITH VARICOSE VEINS AND HEALTH SEEKING BEHAVIOR AMONG PATIENTS OF VARICOSE VEINS COMPARED TO PATIENTS WITH OTHER SURGICAL CONDITIONS

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ABSTRACT

Objectives: To investigate potential associations between risk factors (Groin hernia, Hemorrhoids, Chronic constipation, Body Mass Index, Upper to lower body segment ratio) and varicose veins and describe the health seeking behavior of patients with varicose veins. **Method:** Analytical cross-sectional study of 110 patients with visible varicose veins taken as cases and 110 individuals without any visible varicose veins included in the comparison group. Age, sex and socio-demographic profile were matched for comparison group. **Results:** Mean (SD) age of 110 cases and 110 patients of comparison group was 53.6 (13.6) years and 52.9 (12.2) years respectively. Groin hernia (OR-8.17), chronic constipation (OR-2.13), BMI >25 kg/m2 (OR-3.72) and upper to lower body segment ratio <0.80 (OR-3.22) were found associated with varicose veins. Patients educated above secondary school level education had an average time delay of almost three years in seeking help between appearance of visible changes of varicose veins and presentation to hospital while uneducated patients had almost ten years of time delay. The patients belonging to upper and upper middle class (Modified B.G. Prasad classification for socioeconomic status) had an average time delay of 6.7 years while those belonging to lower middle, upper lower and lower class had a delay of 10.7 years. **Conclusion:** The high-risk groups for varicose veins identified in this study are patients in sixth and seventh decade with lower education and poor socio-economic status and with positive history of groin hernia, chronic constipation, overweight (BMI >25) and upper to lower body segment ratio <0.80.

KEYWORDS

Varicose veins, risk factors, health-seeking behavior, hernia, constipation, body mass index

Introduction:

Varicose veins affect 5% to 30% of the adult population.[1] The prevalence is higher in economically developed countries than in underdeveloped countries.[1,2] As per a study carried out in late 1960s, the prevalence of varicose veins was less in India; however, the change in lifestyle has led to an increase in the incidence of this disease.[3]

Varicose veins has become a common surgical problem in India. The disease is mainly considered to be a cosmetic problem, hence widely mistaken to be medically unimportant.[6,7]. Since associations of many risk factors on varicose veins are conflicting[8,9] and there is a lack of sufficient data on epidemiological aspects and progression of this disease in India[6], it becomes crucial to study the risk factors associated with this disease. We decided to study the specific risk factors such as groin hernia, hemorrhoids, chronic constipation and the association of height & weight with varicose veins in the form of BMI and US/LS ratio. The main reason behind selecting these risk factors is many studies have been done so far focusing on these variables with conflicting association and therefore, we decided to investigate further on these variables.[3,6,8,-12,17] Moreover, health seeking behavior of these patients becomes important in reducing complications and morbidity which has not been studied so far.

Methods:

This study was conducted from June 2017 to May 2018 in a state-run hospital of Central Gujarat. The patients coming to surgical Outpatient department (OPD) and having visible varicose veins in their legs confirmed with Doppler ultrasound were included in this study. The patients coming to surgical OPD who did not have any visible varicose veins or leg complaints confirmed with negative Doppler ultrasound (no valvular incompetence) were included for comparison to study the factors associated with Varicose Veins (i.e. Groin hernia, Hemorrhoids, Chronic constipation, Body Mass Index, Upper to lower body segment ratio). Informed consent was taken from all patients participating in this study. All the patients including cases and comparison group were taken from the same setting (general surgical OPD).

Groin hernia was defined here as protrusion of abdominal organs through a weak point in the lower abdomen and upper thigh and included both inguinal and femoral hernia. Patients were asked about the history of inguinal or femoral hernia or presence of swelling in the groin. Presence of swelling was confirmed with clinical examination. Hemorrhoids were defined as discomfort, itching, swelling or bleeding in the anal region, especially during bowel movements or when sitting due to swollen veins in lower rectum and anal canal. Patients were asked about the history of such symptoms and patients with ongoing symptoms were followed in the examination room with digital examination and anoscopy, if required.

Chronic constipation was defined as unsatisfactory defecation characterized by infrequent stool, difficult stool passage or both at least for past 3 months.[5] Difficult stool passage included patient-reported straining, a sense of difficulty passing stool, incomplete evacuation, hard/lumpy stool or prolonged time to stool.

Basic investigations like height, weight, lower body segment (LS) length and blood pressure were measured using standardized protocols. Upper body segment (US) length was calculated by subtracting lower segment length from total height in order to calculate upper to lower body segment ratio (US/LS ratio).[23,24]

The data regarding socio-demographic profile of the patients, symptoms, duration of the symptoms, time lapse between the appearance of first clinical symptom and presentation to hospital, significant past medical history, family history, occupational history, personal history, type of vein involved, site and treatment history were filled in a pre-tested structured questionnaire. All patients' Doppler ultrasound report of lower limbs were also taken into consideration for confirmatory diagnosis and to find out the type of vein involved. Patients without Doppler ultrasound report were not included in this study. Data was entered and analyzed using Epi-info.

In order to study the association between various clinical factors (groin hernia, hemorrhoids, chronic constipation, BMI, US/LS ratio) and varicose veins, Chi-square test for association was used and p value of <0.05 was considered to be statistically significant. We also calculated Odds ratio (OR) for these variables. Multivariate analysis using forward logistic regression was also done for characteristics (i.e. groin hernia, hemorrhoids, chronic constipation, BMI, US/LS ratio) between cases and comparison group.

Results:

Socio-demographic profile **(Table 1)**

110 patients with and without varicose veins were included in this study. Mean (SD) age of the patients was 53.6. (13.6) years with a range of 22-76 years. Almost half of the patients (51.8%) were in the age group of 51-70 years and least patients were in the age group of 21-30 years. There were 61 (55.4%) males and 49 (44.6%) females. When gender was compared, mean age in males was 54.72 and in females 51.02. Almost four-fifths of the patients had received secondary school level education and one-fourth of the patients were illiterate. Most of them belonged to lower middle, upper lower or lower class according to Modified B.G. Prasad classification.

110 patients coming for complaints other than varicose veins, having no visible varicose veins or any leg complaints confirmed with negative ultrasound with no venous incompetence were included in comparison group in this study. Mean (SD) age of the patients of comparison group was 52.9 (12.2) years with a range of 22-73 years. 57 patients were in the age group of 51-70 years and least patients in the age group of 71-80 years. There were 65 males and 45 females.

Clinical profile **(Table 2)**
Average duration of symptoms (time elapsed from the appearance of first clinical symptom) of varicose veins was 28.2 months. Average time delay in seeking help between appearance of visible changes of varicose veins in lower limb and presentation to hospital was almost 8 years. The most common presenting clinical symptom was pain in legs, followed by swelling in the affected leg and itching over the affected area.

Superficial veins were the most common type of vein involved in reflux on doppler ultrasound. Most common presentation was seen in lower limbs bilaterally. When classified according to Clinical, Etiology, Anatomy, Pathophysiology (CEAP) classification, most cases i.e. 38 out of 110 cases (34.5%) were in C2 phase, 29 (26.4%) were in C4 stage, 27 (24.5%) in C3 stage.

Ten (9.1%) patients of varicose veins had past history of groin hernias (9 inguinal and 1 femoral) and 15 (13.6%) had a past history of hemorrhoids. When patients of comparison group were asked about the associated clinical history, only two (1.8%) patients had inguinal hernia and ten (9.1%) patients had hemorrhoids.

Other clinical characteristics **(Table 3)**
Prolonged standing was seen as a contributing risk factor in 58 (52.7%) patients, most commonly affecting males; 48 out of these 58 patients (82.8%) having a history of standing for at least eight working hours. Thirty (27.3%) patients had positive history of chronic constipation. As compared to cases, in the comparison group, only 17 (15.4%) had history of chronic constipation.

When Clinical stages (CEAP classification) and duration of symptoms were integrated, increased duration of symptoms were observed with each higher clinical class. Patients who were in C2 clinical stage had an average duration of symptoms of 15 months. With C3, C4 and C5 stages, duration of symptoms increased 19.2 months, 24.6 months and 31.1 months respectively.

BMI and Upper segment Lower segment ratio (US/LS ratio) **(Table 4)**
BMI >25kg/m^2 was seen in 49 (46.2%) patients. There were 20 (18.9%) cases where BMI was >30kg/m^2. In comparison group, only 22 (20.0%) patients had BMI >25 kg/m^2 and there were only six (5.4%) patients who had BMI >30 kg/m^2. When gender was compared, mean BMI in females and males with varicose veins was 27.11 kg/m^2 and 23.53 kg/m^2, while in comparison group, it was 23.49 kg/m^2 and 20.87 kg/m^2 in females and males, respectively. For the upper to lower body segment ratio, 55 (52.4%) patients with varicose veins had ratio <0.85; of which 31 (29.5%) patients were seen with ratio <0.80. In case of comparison group, only 47 (42.7%) patients were seen with ratio <0.85, of which only 13 (11.8%) patients were seen with ratio <0.80.

Associated characteristics **(Table 5)**
Age and sex were matched for both cases and comparison group. Characteristics like groin hernia, hemorrhoids, chronic constipation, BMI and upper to lower segment ratio were compared with the comparison group and multivariate analysis was done using forward logistic regression. Of these, groin hernia, chronic constipation, BMI>25 kg/m^2 and US/LS<0.80 were found significantly associated with varicose veins ($p<0.05$).

Health seeking behavior
When the health seeking behavior was assessed, 28 (30.1%) patients with varicose veins wore compression stockings on a regular basis. Out of which, 23 (82.1%) patients were relieved of symptoms by wearing compression stockings. When the education status of these patients was assessed, 15 (53.6%) patients had acquired at least secondary school level education or above. Out of 82 (69.9%) patients with varicose veins who did not wear stockings, 50 (60.9%) patients were either illiterate or had acquired only primary school level education or below.

Married patients had an average duration of 24.8 months of varicose veins while unmarried had varicose veins symptoms since 42.2 months.

Education had an influence on time delay between the appearance of first visible changes of varicose veins and presentation to hospital. Educated patients above secondary education had an average time delay of 2.87 years in seeking help while uneducated patients had a delay of almost 10 years. In addition, the patients belonging to class 1 and 2 (considered upper and upper middle class according to modified B.G. Prasad classification for socio-economic status) had an average time delay of 6.67 years while those belonging to class 3,4 and 5 (considered middle, lower middle and lower class according to modified B.G. Prasad classification) presented after 10.73 years of symptoms.

Discussion:
This study is one of the few from India regarding the factors associated with varicose veins and health seeking behavior of these patients. The San Valentino Vascular Screening Project including 30,000 subjects found a global prevalence and incidence of varicose veins to be 7% and 0.22%, respectively.[10]

Similar to the Tampere study[11], mean age of the patients in our study was 54 years and the most commonly affected age group was between 51-70 years. However, in other studies[6,7], it was 41-60 years. Like most studies[10-13], the prevalence seemed to increase with age in both sexes. This can be due to delayed health seeking in case of the patients in this study.

We found slight male preponderance of varicose veins in this study (M: F ratio being 1.2:1), which was in accordance with Edinburgh Vein study[9] and other studies.[14,15] Male preponderance could probably be due to occupational risk factors.[4,16] However, other studies[8,17] have found more prevalence among females.

Most common presenting symptoms in this study were pain, swelling of legs and itching over the skin. This was similar to studies done in Malaysia and Finland.[18,19] Similar to Mangalore study, superficial veins were involved more frequently in reflux as compared to perforators and deep veins.[6] This result could be aided by the fact that superficial veins have thin and fragile walls.[20] Like other studies[6,17], varicosities were bilateral in most of the cases in this study.

Groin hernias and chronic constipation were significantly associated with varicose veins in this study. Association of varicose veins with hernia has been quoted in a survey in Western Jerusalem[17]. This association supports the etiological role of raised intra-abdominal pressure. Association with chronic constipation can be related to the fact that loaded intestine and colon exert pressure on external iliac veins. Constipation also necessitates straining at stools, which might raise the intra-abdominal pressure that is ultimately transmitted to lower limb veins. This may lead to incompetency of valves on long standing constipation.

Though this study and a survey in Western Jerusalem[17] did not find a significant association with hemorrhoids, the Burkitt study[3] supported the hypothesis of a common etiological factor between varicose veins, DVT and hemorrhoids. However, it also explained how hemorrhoids could appear before varicose veins owing to the fact that valveless hemorrhoidal veins are directly under the effect of intra-abdominal pressure, while the valve system would protect the lower limb veins in the initial phase.

There was a significant association between BMI more than 25 kg/m^2 and varicose veins, especially in women. This study used BMI as a binary variable with 25kg/m^2 as cut-off point. Odds of developing

varicose veins significantly increased to four times as we used BMI of 30 kg/m^2 as a cut-off point. Similar association between Obesity and varicose veins were also found in other studies.[17,21,22]

The Edinburgh vein study and other studies[17,22] showed a significant relationship of increased height with varicose veins. In our study, we also found significant association between US/LS ratio < 0.80 and development of varicose veins. Normal US/LS ratio is 0.89- 0.95.[23,24] We used US/LS ratio as a binary variable with 0.80 as a cut-off point which was selected as it showed the significant difference between cases and comparison group in this study. This finding could possibly be explained by increase in lower segment length which may exert more gravitational force on venous column of lower limbs and cause venous pressure changes.

Not recognizing symptoms as severe owing to incomplete knowledge, lower education, work pressure due to poor socio-economic status and disease mainly being asymptomatic or having few symptoms in initial phase were the common reasons for delayed health seeking behavior and poor adherence to treatment. A higher level of education (above secondary level) had positive effect on the compliance of these patients toward the management of this condition. Married patients sought treatment earlier as compared to unmarried patients.

There are some limitations to our study. Since, this study was done in a single center with relatively small sample size, the findings are not generalizable to the entire population; however, future studies in multiple centers and larger sample size may strengthen our findings. As there were no previous studies done for assessment of US/LS ratio, findings of our study need further evaluation.

This study, being the first to investigate the potential risk factors associated with varicose veins, may help in trying to identify the risk factors and guide early management in such patients.

Conclusion:
Varicose veins are found to be more prevalent in sixth and seventh decades of life. Lower education and lower socioeconomic status are related to increased incidence of varicose veins and its complications in these patients. Groin hernia, chronic constipation, BMI more than 25 and US/LS ratio less than 0.80 are associated with varicose veins. Lower education, poor SES and milder nature of disease in initial stages were found to delay treatment seeking.

Conflicts of interest: None

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Ethical approval: The Institutional Ethics Committee for Human Research (IECHR) of The M.S. University of Baroda approved this study. (EC Reg No: ECR/85/Inst/GJ/2013/RR-16)

Authors Contributions: KD and KS researched literature and conceived the study. AJ was involved in protocol development, gaining ethical approval and supervision. KD and VM were involved in data acquisition and first drafting of the manuscript. KD and KS analyzed and interpreted the data. All authors reviewed and edited the manuscript and approved the final version of the manuscript.

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Tables:

Table 1. Socio-demographic profile of varicose veins patients coming to the surgical department of the tertiary care hospital (n=110)

Characteristics	Number	Percentage
Age group		
21-30	9	8.2
31-40	15	13.6
41-50	19	17.3
51-60	30	27.3
61-70	27	24.5
71-80	10	9.1
Sex		
Males	61	55.4
Females	49	44.6
Residence		
Urban	76	69.1
Rural	34	30.1
Marital status		
Married	95	86.4
Unmarried	11	11.0
Divorced	1	0.9
Missing	3	2.7
Education		
Illiterate	20	18.2
Primary school	35	31.8
Secondary school	34	30.9
Higher secondary or above	21	19.1
Socio-economic status*		
Upper and Upper middle	21	19.1
Lower middle, upper lower and lower	89	80.9
Total	**110**	100.0

*according to Modified B.G Prasad scale for socio-economic status.

Table 2. Clinical profile of varicose veins patients coming to the surgical department of the tertiary care hospital (n=100)

Characteristics	Number	Percentage
Average duration of symptoms	28.2 months	-
Average delay in seeking help	7.99 years	-
Symptom at presentation		
Pain	58	52.7
Swelling	41	37.3
Itching	35	31.8
Asymptomatic	19	17.3
Venous ulcers	9	8.2
Cramping	8	7.3
Throbbing	5	4.5
Burning	4	3.6
Others	4	3.6
Fatigue	3	2.7
Heaviness of legs	2	1.8
Restless legs	1	0.9
Various comorbidities		
Hypertension	24	21.8
Diabetes	11	11
Heart diseases	3	2.7
Coronary artery diseases	3	2.7
Past history		
Surgery in legs or abdomen	17	15.4
Previous leg injuries	25	22.7
Recurrence of similar symptoms	13	11.8
Deep venous thrombosis	2	1.8
Groin hernia	10	9.1
Hemorrhoids	15	13.6
Family history*	11	10.0
Mother	7	63.6
Father	3	27.3
Brother	3	27.3
Sister	2	18.2
Taking regular medications of any health diseases	48	43.6

*Family history to more than 1 person can co-exist.

Table 3. Other characteristics of varicose veins patients coming to the surgical department of the tertiary care hospital (n=110)

Characteristics	Number	Percentage
Occupational history		
Prolonged standing	58	52.7
Prolonged sitting	47	42.7
Prolonged walking	5	4.6
Smoking	17	15.4
Alcohol	17	15.4
Chronic constipation	30	27.3
Wearing tight clothes at waist	14	12.7
Obstetric history*		
Average no. of times patients had been pregnant	3	-
Patients who had 2 or more children	28	57.1
Patients taking OC pills	4	8.2
Caesarian section	4	8.2
Pregnant patients	2	-
Type of vein involved		
Superficial	66	59.7
Perforator	43	39.1
Deep	1	0.9
Site of presentation		
Bilateral	65	59.1
Right leg	26	23.6
Left leg	19	17.3
CEAP classification		
Class		
C1 (telangiectasia or reticular veins)	4	3.6
C2 (Varicose veins)	38	34.5
C3 (with edema)	27	24.5
C4 (with skin changes) C4a-hyperpigmentation C4b-venous eczema C4c-lipodermatosclerosis	24 4 1	21.8 3.6 0.9
C5 (skin changes with healed ulceration)	11	10.0
C6 (skin changes with active ulceration)	1	0.9
Etiology		
Primary	21	19.1
Secondary	87	79.1
Congenital	2	1.8
Anatomic (as in type of vein involved)		
Pathophysiology		
Reflux	83	75.4
Obstruction	18	16.4
Not identified	9	8.2

*sample size is 35. (n=35)

Table 4. BMI and US/LS ratio of cases and comparison group coming to the surgical department of the tertiary care hospital (n=110)

	BMI (in kg/m^2)	Cases[a] (Males= 61, Females= 49)		Comparison group (Males= 65, Females= 45)	
		Number	Percentage	Number	Percentage
	Higher than 25	49	46.2	22	20.0
	Higher than 30	20	18.9	6	5.4
	Lower than 25	57	53.8	88	80.0
Males	Mean	23.53	-	20.87	-
	Higher than 25	20	34.5	8	12.3
	Higher than 30	6	10.3	2	3.1
	Lower than 25	38	65.5	57	87.7
Females	Mean	27.11	-	23.49	-
	Higher than 25	29	60.4	14	31.1
	Higher than 30	14	29.1	4	8.9
	Lower than 25	19	39.6	31	68.9
	US/LS ratio	**Cases[b]**		**Comparison group**	
	Higher than 0.80	74	70.5	97	88.2
	Lower than 0.80	31	29.5	13	11.8

Table 5. Analysis of associated characteristics of varicose veins

Characteristics	Cases	Comparison group	Odds ratio (95% Confidence Interval)	P-value	Adjusted OR(95% Confidence Interval)	Adjusted P Value
Groin hernia	10	2	5.40 (1.15-25.24)	0.0178	8.17 (1.61-41.27)	0.0110
Hemorrhoids	15	10	1.28 (0.57-2.89)	0.2892	1.17 (0.48-2.87)	0.7200
Chronic constipation	30	17	2.05 (1.05-3.99)	0.0328	2.13 (1.02-4.45)	0.0439
BMI >25 kg/m2	49	22	3.43 (1.88-6.28)	0.00004	3.72 (1.90-7.26)	0.0001
US/LS < 0.80	31	13	3.13 (1.52-6.38)	0.0013	3.22 (1.49-6.95)	0.0028

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