Varicose Veins and Associated Risk Factors among Women in the Childbearing Period in Benha city, Egypt: A cross-sectional study

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ABSTRACT

Background: Varicose veins (VV) are a common chronic venous disorder. Women in childbearing period are at high risk and suffer from serious complication including pain, discomfort, leg cramps, ulceration, poor quality of life, absenteeism, and even loss of life. The objective of the present work is to study the prevalence of leg varicose veins, and to identify socio-demographic, lifestyle and other possible risk factors among women in the childbearing period.
Patients and Methods: A cross-sectional study was conducted among 410 women in the childbearing period (15-50 years old) attending Family Medicine Outpatient Clinic at Benha University Hospital, through an interview questionnaire and a clinical examination according to CEAP classification [clinical manifestations (C), aetiological factors (E), the anatomic distribution of disease (A), and underlying pathophysiological findings (P)].
Results: The prevalence of VV was relatively high (51.5%) among the studied population. Univariate analysis showed that age, occupation, education, BMI, family history of VV, lack of exercise, high blood pressure, major contusion with prolonged healing, fracture in lower limb, long standing duration, and shorter exercise duration were significantly associated with the occurrence of VV. Logistic regression showed that family history of VV was the most independent predictor (OR 6.23, 95% CI: 3.62-11.06). **Conclusion:** It is concluded that after controlling for age, logistic regression revealed that family history was the most independent predictors of VV. A suggested comprehensive preventive and control program was designed by the researcher to be tested in further study in the soon future.
Keywords: Varicose Veins, Risk factors, Childbearing period, Benha University, Cross-sectional study.

INTRODUCTION

Varicose veins (VV) are excessively enlarged, tortuous, and darkly colored veins that damage the skin's superficial surface or above. They are commonly found in the lower limbs [1]. VV swell due to a loss of flexibility over time and weak vein valves that allow blood to return through the veins incorrectly. In order to accommodate the excess blood, the veins enlarge, which eventually causes them to lose their suppleness. People may experience pain in the affected area, notice changes to their skin, and develop ulcers there [2].

VV is a common chronic venous condition that affects 20 to 60% of adults worldwide [3].Aly stated that the prevalence of VV was 51.1 percent among patients at Cairo University's family health care unit [4].

According to WHO, women are 3–4 times more likely than men to have a primary VV than the general population in the west. One in five people worldwide suffers from VV, and its incidence is on the rise in the majority of countries [1].

Physical requirements are taken into account as a risk factor for VV [5]. Due to the hard labor and prolonged standing required by their responsibilities (at work and at home), women are at high risk [3].

Millions of workers stand for the majority of the workday and sit for long periods of time. Standing for extended periods of time can cause fatigue, lack of focus, and an increase in health hazards, including leg and foot swelling, foot and joint damage, VV, heart and circulation abnormalities, and lower back issues [6].

Numerous epidemiological studies have demonstrated that, in addition to environmental factors, genetic processes (such as obesity, age, parity, prolonged standing, and family history) may also contribute to vascular disease susceptibility [7]. Depending on the individual, VV can start to manifest as early as adolescence, but prevalence increases with age. Pregnancy occurs frequently when VV initially manifests, and further pregnancies may exacerbate problems. Although a family history of severe symptoms or ulcers is prevalent, people should be reassured that there is little chance that they will experience a similar problem [8].However, they may cause genuine complications, including agony, distress, leg issues, ulceration, diminished quality of life, non-appearance, and even death [3]. VV of the lower appendages is a common complaint that can take numerous shapes, extending from a non-pathologic condition to an unsettling persistent clutter. When they have not been ignored, uncomplicated VVs have frequently been treated by sclerotherapy or surgery, with dynamically effective results [9].

This study aimed to study the prevalence of leg VV, and to identify socio-demographic, lifestyle, and other possible risk factors among women of childbearing age (15–50 years old) attending Family Medicine Outpatient Clinic at Benha University Hospital.

SUBJECTS AND METHODS
Study design: A cross-sectional study was conducted among women of childbearing age (15-50 years old).

Study setting: Family Medicine Outpatient Clinic at Benha University Hospital.

Study subjects: The study was conducted on all women attending Family Medicine Outpatient Clinic at Benha University Hospital and fulfilling the inclusion criteria; females at childbearing period of age (15-50 years old), without associated co-morbidities or attending for emergency visits.

Sampling type and technique: Out of 3 Family Healthcare Units at Benha city, Family Medicine Outpatient Clinic at Benha University Hospital was selected randomly by simple random method. Patients of the study were chosen from those attending the clinic and fulfilling the inclusion criteria by systematic random sample technique, i.e., the first participant was chosen randomly from the clinic then other participants were included every specific number according to the flow until the required sample size was achieved.

Sample size: The study included 410 participants. It was calculated using Cochrans formula, 95% CI (confidence interval), 80% power [10] $N = [Z^2 *(P)* (1-P)]/ E^2$ [N= minimal sample size, Z = Z value (e.g. 1.96 for 95% confidence level), p = percentage picking a choice, expressed as decimal (.5 used for sample size needed), and E = (sample error) the desired level of precision, expressed as decimal (e-g., .05 = ±5)]. It was based on data about VV prevalence (51.1%) from a previous study [4]. Accordingly, the required sample size was 384. Fifty-eight additional subjects (15%) were enrolled to compensate for any missing or incomplete data. So the total sample required = 384+58=442. Missing of data occurred for 32 participants.

Pilot study: Before performing the main study, a pilot testing was carried out. The questionnaire was tested on 10% of patients who was not included in the study results analysis to assess the clarity of questions and the time needed to fulfil the questionnaire.

Content validity:-The interview questionnaire was adapted from a cohort study by Makivara *et al.* 2004. The validation of the questionnaire was performed by comparing the results with a surgeon`s diagnosis in 166 randomly selected 50-year-old participants in the survey. The results of this validation showed that the accuracy of the questionnaire was relatively high, with a specificity of 0.9 (95% CI 0.8-1.0) and a sensitivity of 0.9 (95% CI 0.8-1.0) in women. The questionnaire was translated to Arabic to be suitable for the Egyptian population, and the back translation was then compared with the original U.S. English version.

Study tools: Data was collected via an interview questionnaire and a clinical examination. First, an interview questionnaire was conducted which included basic information with written informed consent; socio-demographic data (sex, age, place of residence, marital status, educational level, occupation, family size and socioeconomic status, according to a modified scale [11]. Thereafter, participants were asked about symptoms of VV (the sensation of heaviness in the leg(s) in the afternoon, pain or a prickling sensation in the leg(s) during the daytime, swelling of the ankle or leg, swelling of the thigh(s), considerable leg pain while standing, numbness in the leg(s), lower extremity pain while at rest, long-standing ulceration or necrosis of the foot or leg, and pain relief upon leg elevation). Also, participant women were asked about VV risk factors (hours spent standing or sitting on her occupation, special habits like smoking, physical exercise (3 to 5 times per week for 20-60 minutes per session) performed to increase physical fitness like brisk walking, aerobics, jogging, bicycling, swimming, rowing [12], parity, obesity, family history of varicosity (parents, grandparents or siblings), the use of contraceptive pills including the duration, the use of medications for any disease, any history of chronic diseases, problems with arterial circulation of the leg, any fractures in the lower extremities, any major contusions with prolonged healing in the lower extremities, leg ulcerations, malignant diseases, and past and current medical and surgical histories.

Second, clinical examinations included general and local examinations, looking for signs of varicosity, and grading it clinically according to the CEAP classification [clinical manifestations (C), aetiological factors (E), the anatomic distribution of disease (A), and underlying pathophysiological findings (P)]; class 0: no visible or palpable signs of venous disease, class 1: telangiectasias or reticular veins, class 2: varicose veins (> 3 mm in diameter), class 3: oedema, class 4a: pigmentation or eczema, class 4b: lipodermatosclerosis (inflammation of the layer of fat under the epidermis), class 5: healed venous ulcer, and class 6: active venous ulcer [4].

Ethical consent:

Research Protocol was approved before the study was conducted by the Research Committee of Benha Faculty of Medicine (RC no.: 242021). Written informed consent (included data about aim of the work, study design, site, time, subject and measures, confidentiality) was obtained from all participants. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

The collected data was statistically presented and analyzed using the Statistical Package for Social Sciences (SPSS) version 26. Mean and standard deviation (±SD) were used to describe quantitative data, and frequency and percentage were used to describe qualitative data. Comparisons between the different study groups were carried out using the chi-square test and the Fisher's exact test to compare proportions as appropriate. Student's t-test was used to examine the difference between two groups regarding parametric data. Multiple logistic regression analysis was carried out; risk was presented as odds ratio (exp(b)) and 95% confidence interval (CI). Statistical significance was accepted at $P \leq 0.05$.

RESULTS

Socio-demographic characteristics: The 410 participants had a mean age of 34.93 (SD 7.94) years, the majority had completed a university-level education (59.3%), and half were house wives (50.0%). More than two fifths of the participants (43.4%) were overweight [Body mass index (BMI) 25-29.9]. More than half (53.9%) of the patients had positive family history of VV. About two-thirds (68.5%) had given birth, 30.0% had a history of using contraceptive pills and 12.9% had worn corsets. In total, 90.7% worked while standing and 10% moved during work. Regarding the duration of physical exercise per day, the mean value was 46.97 (SD 30.35) minutes per day, 2.80 (SD 1.15) times per week. Among the participants, 14.9% was engaged in exercise **(Table 1)**.

Table (1): Socio-demographic characteristics, anthropometric measures in relation to varicose veins.

Variable	N = 410	Varicose veins in the lower extremities		Statistical test	P value
		Present (211)	**Absent (199)**		
Age (mean ± SD)	34.93 ± 7.94	36.08 ± 8.47	33.71 ± 7.17	T test 3.05	0.002 **
Occupation, n (%)				X^2 19.99	0.001 **
Worker	26 (6.3)	20 (76.9)	6 (23.1)		
House wife	205 (50)	117 (57.1)	88 (42.9)		
Student	26 (6.3)	12 (46.2)	14 (53.8)		
Professional worker (Medical/Engineer/Teacher)	70 (17.1)	23 (32.9)	47 (67.1)		
Employee	83 (20.2)	39 (47)	44 (53)		
Education, n (%)				FET 44.38	<0.001**
University	243 (59.3)	105 (43.2)	138 (56.8)		
Diploma	93 (22.7)	50 (53.8)	43 (46.2)		
Secondary	35 (8.5)	21 (60)	14 (40)		
Primary	4 (1)	1 (25)	3 (75)		
Illiterate	35 (8.5)	34 (97.1)	1 (2.9)		
Ever given birth				X^2 3.19	0.074
Yes	281 (68.5)	153(54.4)	128 (45.6)		
No	129 (31.5)	58 (45)	71 (55)		
No of births (mean ± SD)	2.25 ± 1.14	2.33 ± 1.16	2.14 ± 1.12	T test 1.41	0.16
Weight (mean ± SD)	73.18 ± 12.11	75.77 ± 13.40	70.44 ± 9.89	T test 4.57	<0.001**
Height (mean ± SD)	160.05 ± 5.34	159.82 ± 5.39	160.30 ± 5.29	T test 0.90	0.37
BMI				X^2 16.09	0.003**
Normal	104 (25.4)	41 (39.4)	63 (60.6)		
Overweight	178 (43.4)	95 (53.4)	83 (46.6)		
Obesity grade I	63 (15.4)	31 (49.2)	32 (50.8)		
Obesity grade II	50 (12.2)	31 (62.0)	19 (38.0)		
Morbid obesity	15 (3.7)	13 (86.7)	2 (13.3)		
mean ±SD	28.75 ± 5.26	29.88 ± 5.65	27.54 ± 4.54	T test 4.60	<0.001**
Relationships between varicose vein occurrence and other studied variables					
Family history of VV	221 (53.9)	161 (72.9)	60 (27.1)	X^2 87.79	<0.001**
Using contraceptive pills	123 (30)	71 (33.6)	52 (26.1)	X^2 2.76	0.097
Posture during work				X^2 1.38	0.24
Static	372 (90.7)	188 (50.5)	184 (49.5)		
Kinetic	38 (9.3)	23 (60.5)	15 (39.5)		
Ever used corsets	53 (12.9)	33 (62.3)	20 (37.7)	X^2 2.84	0.09
Engage in physical exercise				X^2 9.15	0.01*
Yes	61 (14.9)	23 (37.7)	38 (62.3)		
Occasionally	73 (17.8)	32 (43.8)	41 (56.2)		
No	276 (67.3)	156 (56.5)	120 (43.5)		
DM	39 (9.5)	19 (48.7)	20 (51.3)	X^2 0.13	0.72
HTN	91 (22.2)	65 (71.4)	26 (28.6)	X^2 18.66	<0.001**
Had major contusion with prolonged healing	46 (11.2)	34 (73.9)	12 (26.1)	X^2 10.45	0.001**
Had fracture(s) in lower limb(s)	64 (15.6)	45 (70.3)	19 (29.7)	X^2 10.79	0.001**
Had DVT	36 (8.8)	21 (58.3)	15 (41.7)	X^2 0.75	0.39
Duration of standing during the working day (mean ± SD)	5.60 ± 1.71	6.14 ± 1.78	5.03 ± 1.42	T test 6.93	<0.001**
Exercise duration per day (mean ± SD)	46.97 ± 30.35	59.66 ± 33.98	33.52 ± 18.01	T test 9.65	<0.001**
No. of times per week (mean ± SD)	2.80 ± 1.15	2.44 ± 1.04	3.20 ± 1.14	T test 7.05	<0.001**

DM: Diabetes mellitus. HTN: Hypertension. DVT: Deep venous thrombosis.

VV in lower extremities were detected among 51.5% of the studied group. More than 50% of VV occurred in leg with sensation of heavy legs. Pain manifested swelling of ankles or legs, and swelling of thigh in 45%, 33.6%, and 8.5% respectively of VV cases. Considerable leg pain while standing, lower extremity pain while at rest, permanent change in the color of the skin on the ankle or leg, and long-standing ulceration of the foot or leg were present among 60.2%, 25.6%, 17.5%, and 1.4%, respectively. VV was considered as a cosmetic problem among 63% of cases **(Table 2)**.

The 12 classes of different effects of VV were noticed in our patients, in whom C1 (telangiectasia, 36.5%) was the most common class. Symptoms were relieved by leg elevation in 70.6% of the participants. Among the 211 patients with VV, 29.9% were treated with compressive stockings for more than one month. Only 2.8% of patients underwent a surgical operation, while 8.5% were treated with sclerotherapy (injections in the VV). Varicosities reappeared after treatment in 59.7% of patients who received different types of treatment, and 55.5% needed treatment during the time of the study **(Table 2)**.

Table (2): Prevalence, associated symptoms, local examination and methods of symptom relief and treatment for varicose veins (out of 410 total females).

Variables	No	%
Varicose veins in lower extremities	211	51.5
Site of varicose veins:		
Both legs	50	23.7
Rt leg	45	21.3
Lt leg	39	18.5
Rt and lt shank	32	15.2
Rt shank	5	2.4
Lt shank	3	1.4
Rt thigh	20	9.5
Lt thigh	17	8.1
Sensation of heavy legs	106	50.2
Pain or bricking sensation	95	45.0
Swelling of ankle or legs	71	33.6
Swelling of thigh	18	8.5
Considerable leg pain while standing	127	60.2
Lower extremity pain while at rest	54	25.6
Permanent change in the colour of the skin on the ankle or leg	37	17.5
Long-standing ulceration of the foot or leg	3	1.4
Varicose veins is a cosmetic problem	133	63.0
Local Examination		
C0 (no visible or palpable signs of venous disease)	71	33.6
C1 (telangiectasia)	77	36.5
C2 (varicose veins >3 mm in diameter)	3	1.4
C1/C2 (telangiectasia and varicose veins)	8	3.8
C1/C3 (telangiectasia and oedema)	16	7.6
C1/C4a (telangiectasia and pigmentation)	2	0.9
C1/C2/C3 (telangiectasia, VVs and oedema)	4	1.9
C1/C2/C4a (telangiectasia, VVs and pigmentation)	8	3.8
C1/C2/C4a/C5 (telangiectasia, VVs, pigmentation, healed venous ulcer)	1	0.5
C1/C3/C4a (telangiectasia, oedema and pigmentation)	8	3.8
C2/C4a (VVs and pigmentation)	1	0.5
C2/C3/C4a (VVs, oedema and pigmentation)	2	0.9
C1/C2/C3/C4a (telangiectasia, VVs, oedema and pigmentation)	10	4.7
Methods of symptom relief and treatment for varicose veins		
Symptoms relieved when leg elevated	149	70.6
Symptoms relieved when legs left hanging	7	3.3
Varicose veins treated before	67	31.8
Varicosities recurred after treatment	40/67	59.7
Treatment with compressive stocking for more than one month	63	29.9
Injections for varicose veins	18	8.5
Operation for varicose veins	6	2.8
Varicose veins need treatment currently	117	55.5

Risk factors associated with varicose veins: Univariate analysis showed that age, occupation, education, weight, BMI, family history of VV, lack of exercise, high blood pressure, major contusion with prolonged healing, fracture in lower limb, long standing duration, and shorter exercise duration, were significantly associated with the occurrence of VV (**Table 1**). Logistic regression showed that family history of VV was the most independent predictor of VV. Major contusion with prolonged healing, high blood pressure, education, fracture, duration of standing during the working day, BMI, and practicing physical exercise were independent predictors of the occurrence of VV (p≤0.05) (**Table 3**).

Table (3): Logistic regression to detect the predictable factors of varicose veins.

Variable	P-value	OR	95% CI LL	UL
Education	<0.001	1.76	1.36	2.28
BMI	0.002	1.09	1.03	1.15
Family history of VV	<0.001	6.32	3.62	11.06
Engage in physical exercise	0.053	1.43	0.996	2.05
HTN	0.006	2.73	1.34	5.57
Had major contusion with prolonged healing	0.012	3.16	1.29	7.75
Had fracture(s) in lower limb(s)	0.24	1.60	0.73	3.54
Duration of standing during the working day	<0.001	1.50	1.26	1.78
Exercise duration per day	<0.001	1.04	1.02	1.05

DISCUSSION

The prevalence of VV in this study among women of childbearing age (15-50 years old) was 51.5%. This finding was similar to that found in a cross-sectional study performed among 231 female at El-Nahda in the El-Salam medical area in Cairo 51.1% [4]. This agreement might be due to the common significant risk factors that present in both studies, such as age, family history of VV, and duration of standing and presence of hypertension. In contrast, the prevalence in the present study was higher than that in a study performed in Pusan, republic of Korea with nurses working at a university hospital, in which prevalence was 16.5%. However, a much higher prevalence (78%) was found in another study in Amol, Iran [1].

Our results as regard the site of VV revealed that both legs were affected in 23.7% of the women, which differed from the results of a previous study performed in a hospital in Mangalore, a coastal city in southern India, in which the most common site was on the left side (34.1%) and (37.1%) bilaterally. In **Das et al.** [13] in Liaquat University Hospital in Hyderabad, Pakistan, bilateral presentation was observed in 20%. These results could be due to long duration of sitting or standing (eight or more hours on an average day in sedentary activities) and the reduced level of daily physical activity.

Regarding the signs and symptoms of VV, the main problem was cosmetic appearance (63.0%), the sensation of heaviness in the leg(s) (50.2%), and considerable leg pain while standing (60.2%).

Pain in the lower extremity at rest was reported in 25.6% of the studied women, while only 1.4% of the patients complained of longstanding ulcerations of the leg. As in the current study, other studies found that the main manifestations of VV of the lower extremity in female nurses in east China were cosmetic problem (protrusion of the venules of the lower limb affecting the aesthetic appearance of the leg). In a study by **Joseph et al.** [14] pain was the second most frequent complaint reported in 56.5% of cases, and swelling of the legs was reported in 20% of cases. In contrast to our findings, the most common presenting symptom of VV was ulceration [4]. Other studies found eczema, skin trophic changes and lipodermatosclerosis, and these skin conditions are a late diagnosis of chronic venous insufficiency and ulceration, making a cure difficult [15].

Consequently, screening and clinical examinations of females of childbearing age should be performed on a regular basis as it is important to discover VV early before complications occur. Regarding to the relieving methods and treatment, most of the participants who had VV reported that their symptoms were relieved by elevating their leg(s) (70.6%). Varicosities reappeared after treatment in 59.7% of the 67 patients who received different types of treatment. Approximately 29.9% of patients affected with VV in the current study were treated by compressive stockings for more than one month, while 8.5% were treated with sclerotherapy (injections in VV), and only 2.8% of patients underwent surgical operations. Our findings were in line with the results of **Yun et al.** [16] in Korea, who used compression stockings for management purposes, while the Klitfod study found that 31% of patients were treated surgically, which was different from the present results. This difference may be related to the nature of the Klitfod study, as it measured the effects of different methods of treatment on relieving the symptoms of patients with VV [17].

As regard the risk factors associated with VV, the present study found that the mean age of patients with VV was 34.93 (SD 7.94) years, and there was a significant association between age and the presence of VV (p=0.002). These findings were in one line with the findings of other studies, in which increasing age was associated with a greater chance of developing VV. Also, there was a significant difference in the prevalence of VV among women with different levels of occupation and education, with a higher prevalence of VV noted among workers (labourers) (76.9%) and illiterate women (97.1%) than among non-workers and educated women. This could be due to the fact that workers were exposed to long period of standing, which was considered a risk factor [4].

A family history of VV was significantly associated with the occurrence of varicosities, as was clear from the high percentage of participants who had a family history of varicosities (72.9%). This finding is consistent with those of previous studies showing that family history is a risk factor for VV [18].

Weight and BMI were significantly associated with the occurrence of VV. In concordance with our results, multiple studies found that obesity and weight gain are risk factors for VV [4].

Our results regarding posture maintained during work was not significantly associated with the occurrence of VV, while duration of standing was. We compared our findings with those of previous studies, and found that prolonged sitting or standing has an important role in the development of VV. Engaging in physical exercise was also significantly associated with a reduction in the risk of VV; a similar finding was noted by previous studies, in which the lack of exercise and the performance of unskilled work were identified as significant risk factors [16].

Regarding the comorbidities associated with the occurrence of VV, the current study found a statistically significant relationship between VV and hypertension (p=0.002), a history of a major contusion with prolonged healing in the lower limb (p=0.021) and a fracture in the lower extremities (p=0.007), while no significant associations were found with other comorbidities. These findings were in accordance with those reported by **Ebrahimi et al.** [5] in a study conducted in north eastern Iran in which hypertension was significantly associated with VV.

Multiple logistic regression analysis was performed to find the independent risk factors for VV among females of childbearing period, and only a family history of VV was the most significant independent predictor of the occurrence of VV (P≤0.05). Similar to our findings, **Ebrahimi et al.** [5] reported that age, blood pressure, family history and standing duration were significantly associated with the occurrence of VV.

Limitations of the study: Using a cross-sectional design limited the ability to explore the precise strength of the associations between the identified risk factors and the occurrence of VV.

CONCLUSION

It is concluded that after controlling for age, logistic regression revealed that family history was the most independent predictors of VV. A suggested comprehensive preventive and control program was designed by the researcher to be tested in further study in the soon future.

RECOMMENDATION

It is highly recommended to follow the suggested program for prevention and control.

Conflict of interest: The authors declare no conflict of interest.

Author contribution: Authors contributed equally in the study.

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