JRHS
Journal of Research in Health Sciences

journal homepage: www.umsha.ac.ir/jrhs

JRHS
Journal of Research in Health Sciences

Original article

Prevalence and Risk Factors of Varicose Veins among Female Hairdressers: A Cross Sectional Study in North-east of Iran

Hossein Ebrahimi (PhD)[a], Farzaneh Amanpour (MSc)[b*], Nahid Bolbol Haghighi (MSc)[c]

[a] Center for Health-Related Social and Behavioral Sciences Research, Shahroud University of Medical Sciences, Shahroud, Iran

[b] Department of Epidemiology and Biostatistics, School of Public Health, Shahroud University of Medical Sciences, Shahroud, Iran

[c] Department of Midwifery, School of Nursing & Midwifery, Shahroud University of Medical Sciences, Shahroud, Iran

ARTICLE INFORMATION

* Correspondence

Farzaneh Amanpour (MSc)

Tel: +98 23 32394499

Fax: +98 23 32394852

E-mail: farzaneh.amanpour@gmail.com

ABSTRACT

Background: Venous diseases including varicose veins and chronic venous insufficiency are one of the most important pathogenic factors worldwide. High prevalence of varicose veins and its complications is an emerging problem in the twenty-first century. This study aimed to determine the prevalence and associated risk factors of varicose veins in female hairdressers in Shahroud, north of Iran in 2012.

Methods: In this cross-sectional study, 197 employed hairdressers, licensed by the Health Department of Shahroud University of Medical Sciences, Iran, were studied. Standard physical examination was used to check the condition of varicose veins of the lower extremities of participants. Data were collected by demographic information form. Proportional odds model for ordinal logistic regression was used to assess the relationship between risk factors and status of varicose disease in subjects.

Results: Prevalence of varicose veins was 47.7%. Varicose veins were significantly associated with age (OR=1.08; 95% CI: 1.03, 1.13); family history of varicose disease (OR=1.99; 95% CI: 1.03, 3.82), blood pressure (OR=4.41; 95% CI: 1.63, 11.90); and duration of standing (OR=2.34; 95% CI: 1.05, 5.22).

Conclusions: Varicose veins in the legs of female hairdressers had a high prevalence, and it was associated with increasing age, family history of varicose disease, high blood Pressure, and prolonged standing.

Introduction

Varicose vein is one of the occupational diseases that have affected so many people worldwide. Venous diseases including varicose veins and chronic venous insufficiency are one of the most important pathogenic factors in American and Western societies[1,2]. Varicose veins are dilated, visible and twisted venous that can appear in any part of the body where venous returns to the heart are weak, but are often seen in the lower extremities. This venous dysfunction is a common complaint affecting approximately one third of Great Britain population and is a major cause of morbidity[3]. Given the high prevalence of varicose vein disease, they include most of the referrals to the medical and surgical centers[4]. High prevalence of varicose veins and its complications is an emerging problem in the 21st century, and it leads to an increase in disability and the cost of treatment[5]. Estimated prevalence of varicose veins is quite large and varies from 2% to 56% in men and 1% to 73% in women. These changes reflect the difference in population in terms of age, race, and sex, method of measurement and definition of the disease[1,2]. Varicose veins of the lower extremities are the most common conditions that impose high costs on society[6]. In France, Italy and England, the cost about 10 million Euros

per million citizens spent on treatment of varicose veins of the lower extremities. In England, about 2% of the health care budget is allocated to the control and treatment of these diseases[4].

In some people, varicose veins are asymptomatic, or they cause mild symptoms, but it can cause pain or itching in other people, which can have a significant effect on their quality of life. Varicose veins may become more severe over time and may lead to complications, such as skin discoloration, eczema, superficial thrombophlebitis, bleeding, loss of subcutaneous tissue, lipodermatosclerosis, or venous ulcers[7]. Besides, varicose veins of the lower extremities are one of the risk factors for thrombotic disorders causing great psychological and physical disorders, and ultimately affect the efficiency of work. Therefore, it is necessary to plan to control the risk factors and prevent this complication[8].

Several risk factors including age, sex, family history, obesity, diet, and jobs that require prolonged standing are assumed to develop this disorder. Prevalence of varicose veins is currently more in women than in men[6,9,10]. There is a relationship between the severity of varicose veins and work

history as well as body condition. The physical condition of an occupation is considered as a risk factor for varicose veins[1,10,11]. Hairdressing is a kind of occupation that entails prolonged sitting and standing during work time and consequently can increase the prevalence and severity of varicose veins. Only a small number of studies in Iran investigated the associated risk factors of varicose veins, as an occupational disease.

This study was conducted to determine the prevalence as well as demographic and occupational factors associated with varicose veins in female hairdressers in Shahroud, Nnorth of Iran, in 2012.

Methods

In this cross-sectional study, 197 female hairdressers, licensed by the Health Department of Shahroud University of Medical Sciences, Iran, were studied. This was a census study, in that the entire population was sufficiently small and it was included completely in the study. In order to comply with research's ethics, first, researchers phoned the hairdressers and explained the purpose of the study to them and assured them of confidentiality of their information; then, if hairdressers gave their verbal consent (on the phone) to participate in the study, the researchers went to their workplace and collected their information. Researchers did not even meet the hairdressers who disapproved the study on the phone.

Inclusion criteria included a license of hairdressers' union, being employed as a hairdresser for at least one year at the time of the study, willingness to participate in the study, no history of lower extremity venous disease before engaging in hairdressing. Vice Chancellor for Research- Shahroud University of Medical Sciences- approved the verbal consent for this study and gave researchers the written consent to collect the data from hairdressers.

After obtaining the necessary permissions, the subjects completed the demographic information forms. Demographic information included age, body mass index (BMI), number of pregnancies, family history of varicose veins, hypertension, oral contraceptive pill (OCP), constipation and physical conditions during the day (duration of standing). Measuring blood pressure was done of the right hand of individual in a sitting position after 5 minutes resting by a trained midwifery student using an electronic sphygmomanometer. In addition, the participants' height and weight were measured by a trained midwifery student. Measuring weight was done using a portable analog scale, and evaluation of height was done by a non-elastic tape measure while the subject was standing without shoes or socks.

Definition of chronic venous disease includes report by the participants based on their own diagnosis, or recall of a diagnosis of another person, or a standard physical examination[2]. In this study, standard physical examination (observational method) was used to check the condition of varicose veins of the lower extremities of participants. Thus, the participants were asked to be standing up for at least 10 minutes, in a way that the body weight is transferred on both lower extremities. Then, the prominence of the lower limb veins were observed and classified as follows:

- None = 0: "None"

- Mild = 1: "Few, scattered, varicosities that are confined to branch veins or clusters. Includes ankle flare, defined as > 5 blue telangiectasia at the inner or sometimes the outer edge of the foot"

- Moderate = 2: "Multiple varicosities that are confined to the calf or the thigh"

- Severe = 3: "Multiple varicosities that involve both the calf and the thigh"[12]

Statistical Analysis

Proportional odds model (POM) for ordinal logistic regression was used to assess the relationship between risk factors and status of varicose disease. In order to use the POM model for ordinal categorical response, proportional odds (PO) assumption must be met which assume that the odds ratios are constant for every possible cut points of the outcome, and it can be evaluated by Score test[13-15].

Varicose veins were classified into four grades: none, mild, moderate and severe; due to the low frequencies of moderated and mild varicose cases in some categories of risk factors under the study, we merged the mild and moderate groups in order to avoid the analytical problem.

Variables in this study included age, BMI, pregnancy, family history, blood pressure, OCP, defecation and duration of standing. Age was used as a continuous variable in the model. BMI was classified into four categories: underweight (<20), normal weight (20-24.9), overweight (25-29.9), and obese (>30). There was no varicose case in underweight category, so we merged the underweight and normal categories in order to avoid the analytical problem. Pregnancy was defined as zero: for subjects without pregnancy, one: for subjects with one pregnancy, and two: for subjects with two or more pregnancies. Standing period was coded 1 if the subject stands on his foot less than 3 hours at work and coded 2 otherwise. Family history, blood pressure, OCP, and constipation were coded as one if the subject had the condition and zero otherwise.

Ordinal logistic regression was used to investigate the effect of possible risk factors on varicose veins on legs. Variables age, BMI, pregnancy, family history, blood pressure, OCP, constipation and duration of standing were entered separately to the model, and crude odds ratio (OR) and 95% confidence interval (CI) was estimated for each variable. Furthermore, adjusted OR and 95% confidence interval were estimated using multiple ordinal logistic regressions adjusting for all other risk factor in the model. POM ordinal logistic regression was fitted using Minitab (version 16) and test of parallel line was performed by SPSS (version 18, Chicago, IL, USA) software.

Results

The study was performed on 197 hairdressers, aged 18-68 year with mean age of 37.53 (SD=10.42) year and median age of 36 yr. The prevalence of varicose veins was 47.7%. Of 197 hairdressers in the study, 55 (27.9%) individuals had mild/moderate varicose, and 39 (19.8%) individuals had severe varicose. Prevalence of varicose veins according to BMI, pregnancy, family history, blood pressure, OCP, constipation and duration of standing is shown in Table 1.

Table 1: Distribution of Basic Characteristics in Female Hairdressers Working in Shahroud, Iran

	Varicose vein frequencies		
Variables	**None**	**Mild/Moderate**	**Severe**
Body mass index (kg/m^2)			
<25.0	49	19	4
25.0-29.9	41	23	10
≥30.0	13	13	25
Number of pregnancies			
0	30	10	1
1	30	9	2
≥2	43	36	36
Family History			
Yes	22	19	25
No	81	36	14
High blood pressure (mmHg)			
Yes	5	4	20
No	98	51	19
Oral contraceptive use			
Yes	23	12	2
No	80	43	37
Constipation			
Yes	80	40	19
No	23	15	20
Duration of standing per day			
≤3 hours	33	8	4
>3 hours	70	47	35

The results of ordinal logistic regression are shown in Table 2.

Test of parallel line was not significant (*P*>0.05), that means the ordinal logistic regression provides a good model fit. In simple ordinal regression, except OCP, all the variables had significant relationship with varicose veins. In multiple ordinal regression, variables age (*P*<0.001), blood pressure (*P*=0.003), family history (*P*=0.039) and duration of standing (*P*=0.038) were significantly associated with varicose veins. Increasing the age was associated with the increasing the risk of varicose vein (OR= 1.08; 95% CI: 1.03, 1.13); also, holding all other variables in the model constant, the estimated odds of severe or mild/moderate varicose for people with high blood pressure is estimated to be 4.41 times the odds for people with normal blood pressure (OR=4.41; 95% CI: 1.63, 11.90). In addition, people with family history of varicose vein had approximately two times higher odds of the severe or mild/moderate varicose veins compared to people without the family history of the disease (OR=1.99; 95% CI: 1.03, 3.82). Moreover, odds of mild/moderate or severe varicose for people who were standing up more than three hours during their work time was 2.34 times higher than the odds for people who are on feet less than three hours a day (OR=2.34; 95% CI: 1.05, 5.22).

Table 2: Associated Risk Factors of Varicose Veins by POM Ordinal Logistic Regression Model in Female Hairdressers Working in Shahroud, North of Iran

	Crude odds ratio			Adjusted odds ratio		
Variables	**OR**	**95% CI**	***P* value**	**OR**	**95% CI**	***P* value**
Age (yr)	1.13	1.09, 1.16	0.001	1.08	1.03, 1.13	0.001
Body mass index (kg/m^2)						
<25.0	1.00			1.00		
25.0-29.9	1.77	0.91, 3.43	0.092	0.73	0.33, 1.60	0.431
>30.0	8.75	4.16, 18.43	0.001	1.12	0.40, 3.14	0.828
Pregnancy						
0	1.00			1.00		
1	1.03	0.39, 2.75	0.950	0.97	0.34, 2.83	0.960
≥2	5.29	2.42, 11.59	0.001	1.26	0.42, 3.77	0.670
Family History						
No	1.00			1.00		
Yes	3.81	2.14, 6.79	0.001	1.99	1.03, 3.82	0.039
High blood pressure (mmHg)						
No	1.00			1.00		
Yes	13.54	5.74, 31.90	0.001	4.41	1.63, 11.90	0.003
Oral contraceptive use						
No	1.00			1.00		
Yes	0.52	0.25, 1.07	0.075	1.06	0.47, 2.38	0.894
Constipation						
No	1.00			1.00		
Yes	0.41	0.23, 0.73	0.002	0.89	0.44, 1.77	0.733
Duration of Standing per day						
≤3 hours	1.00			1.00		
>3 hours	3.20	1.56, 6.58	0.002	2.34	1.05, 5.22	0.038

Discussion

This study was conducted to evaluate the prevalence and risk factors associated with varicose veins in female hairdressers working in Shahroud, Iran. Only a small number of studies in Iran investigated the associated risk factors of varicose veins, as an occupational disease, and they are all conducted on nurses. The prevalence of varicose veins in this study was 47.7% (27.9% mild/moderate varicose veins and 19.8% severe varicose veins). In the study by Nassiri Foourg et al., the prevalence of varicose veins of the lower extremities in female nurses was reported 65.3% (43.5% mild

varicose veins, 18.5% moderate varicose veins and 3.2% severe varicose veins)[8]. Sharifnia et al. reported the prevalence of varicose veins of nurses 73.9%, in that the prevalence of varicose veins among female nurses was 78%[16].

Estimated prevalence of varicose veins varies widely from 2% to 56% in men and from 1% to 73% in women. This variation in estimated prevalence may be due to the difference in the study design, diagnostic criteria and population characteristics including age, gender and race[1,2]. Beebe-Dimmer and his colleagues compared the estimated

prevalence of varicose veins in different countries and illustrated that the prevalence is higher in more developed countries[1]. In Budapest, Hungary, The prevalence of varicose veins in the lower extremities was 57.1%[17]. In a population-based study in France, the prevalence of varicose veins in the lower extremities was 50.5% in women and 30.1% in men[18].

According to the study's results, increasing age was associated with higher chance of developing varicose veins. The results are similar to other studies in this field[1, 2, 8, 9, 17, 18].

Estimated crude OR in this study showed that increasing BMI was significantly associated with an increase in the prevalence of varicose veins. Many studies have reported obesity and weight gain as known risk factors for varicose veins[1, 9, 17, 18]. One study in Iran reported the significant relationships between weight gain and risk of varicose veins of the lower limbs and its intensity[8]; however, these studies either used univariate analysis or did not adjust the model for some important risk factors such as age. In our study, considering other variables in the model, multiple logistic regression showed no significant relationship between BMI and risk of varicose veins; one explanation may be the positive relationship between age and BMI, in that, older people in our study tend to have higher BMI. There was no association between BMI and risk of varicose in the logistic model adjusted for age [11]. Obesity had been suggested as a risk factor aggravating varicose veins instead of the primary risk factors[2].

The result of crude mode showed a significant association between number of pregnancies and risk of varicose veins. Most of the studies with univariate analysis have been reported pregnancy as a known risk factor for varicose veins[1, 2, 17, 18]. The results of multiple logistic regression showed that number of pregnancies was not significant in the presence of other variables such as age. The possible explanation is similar to what was noted for BMI; in other words, the positive relationship between age and number of pregnancies in our study may lead to this result. Pregnancy was not a significant factor in the model adjusted by age[11, 18, 19].

According to the results of simple and multiple ordinal regression, risk of varicose veins in individuals with a positive family history of this disease was more than the risk for people without the family history. Many Studies have reported family history as a risk factor for varicose veins[1, 10, 18, 20]. Interpretation of results related to heredity and family history must be done with caution because biased recall could influence the finding[1, 8].

In this study, higher blood pressure was significantly associated with the higher odds of lower limb varicose veins. A few studies have investigated the effect of blood pressure on varicose veins, and their results are not well established. Further studies are needed to confirm this association. However, some studies reported hypertension as a risk of varicose veins[1].

Our analysis revealed no significant correlation between the use of oral contraceptives and the risk of varicose veins. A small number of studies have examined the relationship between OCP and varicose veins, and they reported no association or negative association between OCP and risk of varicose veins[1]. In some studies, the use of oral contraceptives and hormone replacement therapy as risk factors for varicose veins was not confirmed, that is similar with the results of this study[11, 17].

The results of crude model showed that the risk of constipation is associated with an increased risk of lower limb varicose veins. However, multiple ordinal logistic regression analysis showed that this association was not significant in the presence of other variables. Fowkes et al. found an association between constipation and varicose veins only in men, but not in women[11]. Beebe-Dimmer et al. discussed the relationship between deficient in fiber and constipation, and their effect on varicose veins, reported in different studies[1], but no recent study has been conducted on this subject.

The results of crude and multiple ordinal logistic regressions showed that increasing hours of standing at work increased the risk of varicose veins. Many studies have indicated the prolonged standing or sitting as known risk factor for the risk of lower extremity varicose veins[1, 8, 17].

Most of the previous studies on risk factor of varicose veins applied univariate analysis and consequently ignored controlling for potential confounders[1]. More recent studies, however, used multiple nominal logistic regression to resolve this problem[7, 8, 18, 20]. The strength of our study is that we used multiple ordinal logistic regression; when response outcome is ordinal, ordinal logistic regression provides the more powerful and simpler interpreted model compared to nominal logistic regression[13-15].

However, this study had some limitations; first, having constipation was asked subjectively, based on the judgment of the participants. Second, people in this study were homogeneous in terms of some potential risk factors of varicose veins - such as having diabetes, hormone replacement therapy (HRT), smoking, surgery, injury, hernia, trauma and flat feet; in fact, most of the participants had neither of these conditions, so that we could not include these variables in the study model and investigate their effects. Due to these limitations, and given the high prevalence of varicose veins, a population-based study considering all above potential risk factors is recommended.

Conclusions

This study showed a high prevalence of varicose veins in the legs of female hairdressers. In addition, results of ordinal logistic regression model have found the significant association between varicose veins and some of the above risk factors such as age, blood pressure, family history and prolonged standing.

Acknowledgments

Conflict of interest statement

The authors have no competing interest.

References

1. Beebe-Dimmer JL, Pfeifer JR, Engle JS, Schottenfeld D. The Epidemiology of Chronic Venous Insufficiency and Varicose Veins. *Ann Epidemiol*. 2005;15(3):175-184.

2. Robertson L, Evans C, Fowkes FGR. Epidemiology of chronic venous disease. *Phlebology*. 2008;23(3):103-111.

3. Onida S, Davies AH. Varicose veins: diagnosis and management. *Nurs Times*. 2013;109(41):16-17.

4. London NJM, Nash R. ABC of arterial and venous disease. varicose veins. *BMJ*. 2000;320(7246):1391-1394.

5. Sorte S, Waghmare L, Banode P, Srivastava T, Biswas D. Research article effect of height on chronic venous insufficiency patients of rural wardha: a cross sectional study. *Int J Recent Sci Res*. 2012;3(11):977-981.

6. Laurikka JO, Sisto T, Tarkka MR, Auvinen O, Hakama M. Risk indicators for varicose veins in forty- to sixty-year-olds in the Tampere varicose vein study. *World J Surg*. 2002;26(6):648-651.

7. Marsden G, Perry M, Kelley K, Davies AH. Diagnosis and management of varicose veins in the legs: summary of NICE guidance. *BMJ*. 2013;347:f4279.

8. Nasiri- Foourg A, Kazemi T, Nakhaii N, Kazemi N. Lower limb varicose veins and their relationship with risk factors in nurses of the Birjand University of Medical Sciences Hospital's. *Journal of Birjand University of Medical Sciences*. 2005;12(1-2):60-70.[Persian]

9. Clark A, Harvey I, Fowkes FGR. Epidemiology and risk factors for varicose veins among older people: cross-sectional population study in the UK. *Phlebology*. 2010;25(5):236-240.

10. Criqui MH, Jamosmos M, Fronek A, Denenberg JO, Langer RD, Bergan J, et al. Chronic venous disease in an ethnically diverse population: the San Diego Population Study. *Am J Epidemiol*. 2003;158(5):448-456.

11. Fowkes F, Lee A, Evans C, Allan P, Bradbury A, Ruckley C. Lifestyle risk factors for lower limb venous reflux in the general population: Edinburgh Vein Study. *Int J Epidemiol*. 2001;30:846-852.

12. Vasquez MA, Rabe E, McLafferty RB, Shortell CK, Marston WA, Gillespie D, et al. Revision of the venous clinical severity score: Venous outcomes consensus statement: Special communication of the American Venous Forum Ad Hoc Outcomes Working Group. *J Vasc Surg*. 2010;52(5):1387-1396.

13. Kleinbaum DG, Klein M. *Logistic regression*. 2nd ed: Atlanta: Springer; 2002.

14. Agresti A. *An introduction to categorical data analysis*. 2nd ed: Florida: John Wiley; 2007.

15. Kutner M, Nachtsheim C, Neter J, William L. *Applied Linear Statistical Models*. 5th ed: Chicago: McGraw-Hill; 2005.

16. Sharif nia H, Ghorbani M, Beheshti Z, Taebbi S, Mahboobi M, Mirza jani F, et al. Determine the prevalence of varicose in lower extremities in nurses and some related factors. *Iran J Nurs Res*. 2010;5(17):23-31. [Persian]

17. Bihari I, Tornoci L, Bihari P. Epidemiological study on varicose veins in Budapest. *Phlebology*. 2012;27(2):77-81.

18. Carpentier PH, Maricq HR, Biro C, Poncot-Makinen CO, Franco A. Prevalence, risk factors, and clinical patterns of chronic venous disorders of lower limbs: a population-based study in France. *J Vasc Surg*. 2004;40(4):650-659.

19. Lee A, Evans C, Hau C, Allan P, Fowkes F. Pregnancy, oral contraception, hormone replacement therapy and the occurrence of varicose veins: Edinburgh vein study. *Phlebology*. 1999;14:111-117.

20. Berard A, Abenhaim L, Platt R, Kahn S, Steinmetz O. Risk factors for the first time development of venous ulcers of the lower limbs: The influence of heredity and physical activity. *Angiology*. 2002;53:647-657.