

✧ RESEARCH PAPER ✧

Varicose veins of the legs among nurses: Occupational and demographic characteristics

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Varicose veins of the legs among nurses—Occupational and demographic characteristics

This study aims to determine the relationship between occupational and demographic hazards that characterize varicose veins (VV) in the legs and their intensity among nurses. A cross-sectional study was carried out among 203 nurses from three general hospitals in Amol, Iran. The required subjects' information was collected through a self-filled questionnaire and the physical examination of the VV intensity was based on the Clinical finding using the Etiology, Anatomic finding, Pathophysiological standards. The prevalence of VV, with different degrees, was 72.4% (95% CI 65.7–78.4), with women having a higher prevalence compared with men (77.9% vs. 56.9%, $P = 0.004$). The other non-interventional risk variable was having longer years of service. Interventional variables were long-standing hours, overtime work and body mass index status. This study had determined the occupational risk variables on VV which could be interventional in improving the working nurses' environment and quality of life for their long-term career.

Key words: demographic factors, Iran, nursing, occupational factors, varicose veins.

INTRODUCTION

Varicose vein (VV) of the lower limbs is considered as the most common vascular disorder in humans, creating serious signs and symptoms in patients and sometimes lead to surgical treatments¹ and widespread morbidity.² This is also one of the major causes of morbidity in the United States and Western countries.³ Such a disorder has suffered nearly a one quarter of the adult population in these countries and is the considerable reason for use of health-care resources and services.⁴ Leg varicose has been reported differently in various populations, so the prevalence of the adults' VV is different, from 7% to 40% in men and 14% to 51% in women. Recently, a report has been published, in which the prevalence of VV has been announced to be different, between 2–56% in men and 1%–73% in women.³ In another study, the incidence of varicose has been reported 18.7% in Asian ethnic groups.⁵ Clinical appearances of the VV include skin atrophic changes, some degree of pigmented dermatitis to lipodermosclerosis, white atrophy, leg ulcers, ankle oedema and pigmentation,⁶ so they are detectable due to their swollen and twisted form.⁷ Appearance and progression of VV are functions of four underlying factors, such as genetic background, female sex hormones, and hydrostatic and hydrodynamics forces resulting from muscle contraction.⁸

During the past few decades, various theories have been proposed about lower limb VV-causing factors, including obesity, physical working conditions, constipation, tight underwear, hormonal factors and taking oral contraceptive pill, but none has been fully introduced as a definitive cause.⁵ Blood hydrostatic force in standing position along with other intrinsic factors such as heredity can contribute to varicose creation because upwards blood pumping takes place with muscle contraction, standing is worse than walking for varicose patients and hydrodynamics pressure does not help blood discharge in this state; thus, the patient's occupation can be among the disorder-intensifying factors.³ The aetiology of chronic venous disease in the legs is multifactorial. Primary risk factors are: inheritance, gender, obesity and multiple pregnancies. Secondary risk factors include the workplace condition of certain professions (ortostasis).⁹ Lifting heavy objects and years of services have been suggested as other occupational risk factors for VV.⁵ A previous prospective Danish population-based study on hospitalizations due to VV was based on data linked at an aggregated level and showed that the relative risk for VV among 'people who

stand more than $\frac{3}{4}$ their work shift' compared with the other employees was 1.85 (95% CI 1.33 to 2.36) for men and 2.63 (95% CI 2.25 to 3.02) for women.¹⁰ Prolonged standing is clearly associated with an increase in frequency of distal lower extremity pain symptoms.¹¹

Nursing profession is perceived as a high-risk occupation, in which positions such as long-time standing and sitting and gruelling physical states are inevitable during the work.¹² In spite of varicose appearance, as the main patients' complaint, other symptoms such as dull pain, feeling heavy in legs, night cramps and sometimes varicose inflammation as thrombophlebitis are observed.¹³ As nurses are the major constituents of health-care systems, such frustrating and overwhelming positions can lead to disruption in services and workforces early disengaging from health therapeutic system, as well as additional dissipation of economic resources by the individual and society to treat the imposed damages. The issue is highly important, for it can jeopardize working output and old-age health, underlying thrombotic problems, and other serious complications.¹² Therefore, this study was performed to assess the prevalence of leg varicose of the nurses working in Iran's hospitals and to determine the demographical and occupational hazards.

METHODS

Definitions

Varicose veins: 'dilated, palpable subcutaneous veins generally over 4 mm'; reticular veins: 'dilated, non-palpable subcutaneous veins less than 4 mm'; telangiectasia: 'dilated intradermal veins less than 1 mm'.³

Design

Amol, which is in the north of Iran, has a population of 1 million. In this cross-sectional study, conducted in the spring of 2010, all nursing staff personnel of Amol hospitals with at least 2 years of service were selected as participants ($n = 225$). Consent to conduct the study in each of the hospitals was obtained. Nurses were working at least 48 h per week; however, their shifts might vary. Nurses with a long working experience had priority to choose their shifts first, and because of that they usually worked in the morning shift (between 7:30 and 13:30), more or less constantly. On the other hand, junior nurses worked in different shifts including night-time (between 19:30 and 7:30); it should be mentioned that by the current regulation, one cannot work the day after a night

shift. Exclusion criteria in the study were: pregnancy at the time of study, the women with history of complicated pregnancy such as arterial hypertension or venous thrombosis, had a history of diabetes, previous deep vein thrombosis (DVT) history, cancer, very recent surgery or anaesthesia, leg paresis, arterial insufficiency, hypertension, phlebitis, and sick leave. Finally, 203 subjects agreed to participate to the study. The study was approved by the ethics committee of Babol University of Medical Science.

For data collection, a researcher-made questionnaire was used.^{6,12,14–16} The questionnaire had two parts. The first section (self-filled) contained questions about the demographic factors and personal characteristics (e.g. age, sex, weight, height, body mass index (BMI), number of pregnancy, marital status, educational level, doing exercise, bowel movements, family history of VV and flat feet). The second section (self-filled) contained questions about condition and situation of nursing duty (e.g. amount of overtime per month, years of service, period of time sitting, standing and walking posture in the ward: less than 2 h, 2–4 h and more than 6 h).

The validity of the questionnaire was assigned by content validity; 10 persons' opinion (expert in cardiovascular and general surgery) was used and questionnaire reliability was determined by test–retest. At first, the questionnaire was given to 10 nurses. In 2 weeks' time, they were asked again to fill out the questionnaire and the correlation coefficient was calculated ($r = 0.93$). Participants' had physical examination by a specialist in general surgery to check for the presence and intensity of VV by the standard CEAP form (C: clinical finding; E: aetiology; A: anatomic finding; P: pathophysiological),¹⁷ including flat foot diagnosis.

The varicose intensity was classified into seven clinical degrees as follows:

- C0 = no visible venous
- C1 = telangiectatic or reticular veins
- C2 = varicose veins
- C3 = oedema
- C4 = skin changes without ulceration
- C5 = skin changes with healed ulceration
- C6 = skin changes with active ulceration

Statistical analysis

The analyses were performed using SPSS 16.0 (released 2007; SPSS for Windows, SPSS Inc., Chicago, IL, USA). Basic descriptive for quantitative variables was presented using mean (SD) and n (%) for qualitative variables. Unadjusted and adjusted odds ratios (ORs) with 95% confidence interval (CI) were presented for the risk of leg varicose intensity using ordinal regression with logit link and logistic regression for the leg varicose presence. Statistical significance was set at $P < 0.05$.

RESULTS

Among the participants, 145 (71.4%) were women, from whom 159 (78.3%) were married and 120 (59.1%) possessed bachelor's and higher academic degrees. Most of the subjects (39.9%) were in the < 30 years age bracket. Fifteen cases (7.4%) had flat feet and 69 (34%) a family history of VV. Eighty-three (40.9%) had BMI of overweight and 44 cases (21.7%) would exercise regularly as well.

Based on the standard CEAP form (Fig. 1), the prevalence of leg VV, with different intensity, was 73.9% (95% CI 65.7–78.4), with women having a higher dominance (77.9% vs. 56.9%, $P = 0.003$, OR = 2.7, 95% CI 1.4–5.1).

The risk predictors for both leg varicose intensity (Table 1) and leg varicose presence (Table 2) were

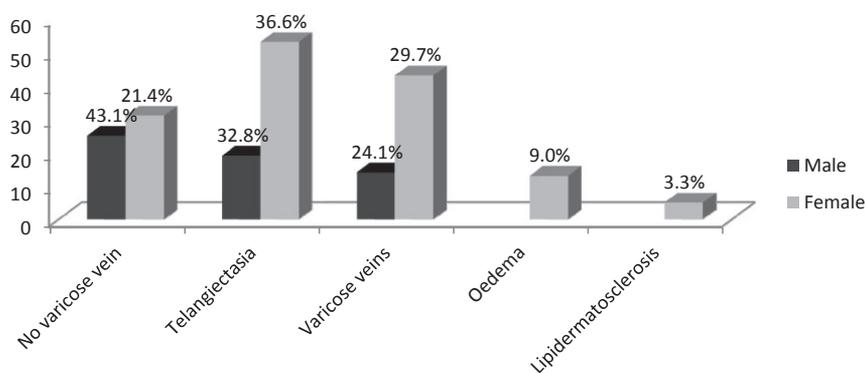


Figure 1. Frequency and percent distribution of leg varicose intensity among nurses.

Table 1 Predictors for leg varicose intensity among working nurses

Variable	N	C ₀ (n = 56)	C ₁ (n = 72)	C ₂ (n = 57)	C ₃ (n = 13)	C ₄ (n = 5)	Unadjusted		Adjusted	
							OR (95% CI)	P-value	OR (95% CI)	P-value
Male	58	25 (43.1)	19 (32.8)	14 (24.1)	0 (0.0)	0 (0.0)	1.0		1.0	
Female	145	31 (21.4)	53 (36.6)	43 (29.7)	13 (9.0)	5 (3.4)	2.7 (1.5–4.8)	0.0006	6.5 (3.0–14.2)	< 0.001
Age										
< 30	81	27 (33.3)	32 (39.5)	19 (23.5)	3 (3.7)	0 (0.0)	1.0			
30–40	77	16 (20.8)	31 (40.3)	23 (29.9)	6 (7.8)	1 (1.3)	1.7 (0.9–3.1)	0.055	†	—
> 40	45	13 (28.9)	9(20.0)	15 (33.3)	4 (8.9)	4 (8.9)	2.3 (1.2–4.5)	0.014		
BMI										
Normal	80	32 (40.0)	28 (35.0)	18 (22.5)	1 (1.3)	1 (1.3)	1.0		1.0	
Overweight	83	16 (19.3)	35 (42.2)	22 (26.5)	8 (9.6)	2 (2.4)	2.3 (1.3–4.1)	0.004	2.1 (1.1–3.8)	0.024
Obese	40	8 (20.0)	9(22.5)	17 (42.4)	4 (10.0)	2 (5.0)	3.8 (1.8–7.7)	< 0.001	2.2 (0.9–4.8)	0.058
Married	159	41 (25.8)	54 (34.0)	50 (31.4)	9 (5.7)	5 (3.1)	1.6 (0.9–3.0)	0.110	1.4 (0.7–2.8)	0.281
Single	44	15 (34.1)	18 (40.9)	7 (15.9)	4 (9.1)	0 (0.0)	1.0		1.0	
Pregnancy parity										
Zero	59	16 (27.1)	25 (42.4)	13 (22.0)	4 (6.8)	1 (1.7)	1.0			
One	43	10 (23.2)	18 (41.9)	12 (27.9)	3 (7.0)	0 (0.0)	1.2 (0.6–2.4)	0.668	‡	—
Two or more	44	6 (13.7)	10 (22.7)	18 (40.9)	6 (13.6)	4 (9.1)	3.6 (1.7–7.4)	0.001		
Education										
Bachelor and higher	83	23 (27.7)	28 (33.7)	24 (28.9)	7 (8.4)	1 (1.3)	1.1 (0.6–1.8)	0.813	1.1 (0.6–2.0)	0.762
Lower	120	33 (27.5)	44 (36.7)	33 (27.5)	6 (5.0)	4 (3.3)	1.0		1.0	
Exercise										
Yes	44	21 (47.7)	8 (18.2)	14 (31.8)	0 (0.0)	1 (2.3)	1.0		1.0	
No	159	35 (22.0)	64 (40.3)	43 (27.0)	13 (8.2)	4 (2.5)	2.2 (1.2–4.0)	0.015	1.6 (0.8–3.1)	0.215
Bowel movement										
Regular	120	40 (33.3)	42 (35.0)	29 (24.2)	6 (5.0)	3 (2.5)	1.0		1.0	
Irregular	83	16 (19.3)	30 (36.2)	28 (33.7)	7 (8.4)	2 (2.4)	1.8 (1.1–3.1)	0.022	1.1 (0.6–2.0)	0.721
Family history										
Yes	69	13 (18.8)	22 (32.0)	25 (36.2)	8 (11.6)	1 (1.4)	2.1 (1.2–3.6)	0.006	1.7 (0.9–3.1)	0.080
No	134	43 (32.1)	50 (37.3)	32 (23.9)	5 (3.7)	4 (3.0)	1.0		1.0	
Sole										
Flat	15	4 (26.7)	2 (13.3)	5 (33.3)	4 (26.7)	0 (0.0)	2.4 (0.9–6.4)	0.069	2.2 (0.8–6.2)	0.144
Normal	188	52 (27.7)	70 (37.2)	52 (27.7)	9 (4.8)	5 (2.6)	1.0		1.0	
Walking										
Less than 2 h	18	6 (33.3)	6 (33.3)	3 (16.7)	1 (5.6)	2 (11.1)	1.0		1.0	
Between 2–4 h	56	15 (26.8)	24 (42.9)	13 (23.3)	3 (5.4)	1 (1.8)	0.9 (0.4–2.5)	0.926	0.7 (0.2–2.0)	0.517
More than 4 h	129	35 (27.0)	42 (32.6)	41 (31.8)	9 (7.0)	2 (1.6)	1.2 (0.5–2.9)	0.718	1.0 (0.4–2.7)	0.984
Sitting										
Less than 2 h	137	43 (31.4)	46 (33.6)	34 (24.8)	12 (8.8)	2 (1.4)	1.0		1.0	
Between 2–4 h	20	7 (35.0)	8 (40.0)	4 (20.0)	0 (0.0)	1 (5.0)	0.7 (0.3–1.7)	0.453	0.5 (0.2–1.4)	0.182
More than 4 h	46	6 (13.0)	18 (39.2)	19 (41.3)	1 (2.2)	2 (4.3)	1.8 (0.9–3.3)	0.062	0.6 (0.3–1.3)	0.228
Standing										
Less than 2 h	31	14 (45.2)	6 (19.4)	8 (25.8)	1 (3.1)	2 (6.5)	1.0		1.0	
Between 2–4 h	84	28 (33.3)	31 (36.9)	21 (25.0)	3 (3.6)	1 (1.2)	1.1 (0.5–2.4)	0.744	0.9 (0.4–2.2)	0.860
More than 4 h	88	14 (15.9)	35 (39.8)	28 (31.8)	9 (10.2)	2 (2.3)	2.4 (1.1–5.1)	0.023	2.3 (1.01–5.4)	0.049
Overtime (hours)										
mean (SD)	203	43.3 (39.8)	67.8 (48.5)	61.7 (44.2)	41.8 (35.0)	40.0 (41.8)	1.0 (0.99–1.01)	0.319	1.01 (0.99–1.013)	0.056
Years of service										
mean (SD)	203	9.7 (7.8)	9.4 (6.3)	10.5 (7.0)	13.6 (7.4)	24.0 (5.2)	1.05 (1.01–1.09)	0.005	1.07 (1.03–1.12)	0.001

† Variable omitted due to multicollinearity with years of service. ‡ Variable omitted due to multicollinearity with sex. Values are n (%), or otherwise stated. An ordinal regression (with logit link) model was performed to evaluate the contribution of each factor to the leg varicose veins intensity. BMI, body mass index; CI, confidence interval; C₀, no varicose vein; C₁, telangiectasia; C₂, varicose veins; C₃, oedema; C₄, lipidermatosclerosis; OR, odds ratio; SD, standard deviation.

Table 2 Predictors for leg varicose prevalence among working nurses

Variable	N	No (n = 56)	Yes (n = 147)	Unadjusted		Adjusted	
				OR (95% CI)	P-value	OR (95% CI)	P-value
Male	58	25 (43.1)	33 (56.9)	1.0		1.0	
Female	145	31 (21.4)	114 (78.6)	2.7 (1.4–5.1)	0.003	5.8 (2.0–17.2)	0.001
Age							
< 30	81	27 (33.3)	54 (66.7)	1.0			
30–40	77	16 (20.8)	61 (79.2)	2.0 (0.9–4.1)	0.055	†	—
> 40	45	13 (28.9)	32 (71.1)	1.3 (0.6–2.9)	0.515		
BMI							
Normal	80	32 (40.0)	48 (60.0)	1.0		1.0	
Overweight	83	16 (19.3)	67 (80.7)	2.7 (1.4–5.5)	0.005	2.4 (1.1–5.5)	0.032
Obese	40	8 (20.0)	32 (80.0)	3.3 (1.3–8.4)	0.012	3.1 (0.96–3.3)	0.059
Married	159	41 (25.8)	118 (74.2)	1.4 (0.7–2.9)	0.317	1.4 (0.6–3.3)	0.444
Single	44	15 (34.1)	29 (65.9)	1.0		1.0	
Pregnancy parity							
Zero	59	16 (27.1)	43 (72.9)	1.0			
One	43	10 (23.2)	33 (76.8)	1.3 (0.5–3.3)	0.530	‡	—
Two or more	44	6 (13.7)	38 (86.3)	2.6 (0.9–7.2)	0.073		
Education							
Bachelor and higher	83	23 (27.7)	60 (72.3)	1.0 (0.6–1.9)	0.923	1.1 (0.6–2.0)	0.433
Lower	120	33 (27.5)	87 (72.5)	1.0		1.0	
Exercise							
Yes	44	21 (47.7)	23 (52.3)	1.0		1.0	
No	159	35 (22.0)	124 (78.0)	3.1 (1.6–6.3)	0.001	2.1 (0.8–5.1)	0.111
Bowel movement							
Regular	120	40 (33.3)	80 (66.7)	1.0		1.0	
Irregular	83	16 (19.3)	67 (80.7)	2.2 (1.1–4.2)	0.022	1.0 (0.4–2.4)	0.969
Family history							
Yes	69	13 (18.8)	56 (81.2)	2.1 (1.1–4.3)	0.038	1.3 (0.6–3.1)	0.490
No	134	43 (32.1)	91 (67.9)	1.0		1.0	
Sole							
Flat	15	4 (26.7)	11 (73.3)	1.1 (0.3–3.5)	0.899	0.9 (0.2–4.0)	0.928
Normal	188	52 (27.7)	136 (72.3)	1.0		1.0	
Walking							
Less than 2 h	18	6 (33.3)	12 (67.7)	1.0		1.0	
Between 2–4 h	56	15 (26.8)	41 (73.2)	1.5 (0.5–4.7)	0.490	1.7 (0.4–6.8)	0.461
More than 4 h	129	35 (27.0)	94 (73.0)	1.2 (0.4–3.6)	0.685	1.3 (0.4–4.5)	0.698
Sitting							
Less than 2 h	137	43 (31.4)	94 (68.6)	1.0		1.0	
Between 2–4 h	20	7 (35.0)	13 (65.0)	0.9 (0.3–2.4)	0.797	0.8 (0.2–2.6)	0.687
More than 4 h	46	6 (13.0)	40 (87.0)	3.2 (1.2–8.0)	0.015	1.6 (0.5–4.9)	0.435
Standing							
Less than 2 h	31	14 (45.2)	17 (54.8)	1.0		1.0	
Between 2–4 h	84	28 (33.3)	56 (66.7)	1.6 (0.7–3.8)	0.244	1.3 (0.4–3.7)	0.647
More than 4 h	88	14 (15.9)	74 (84.1)	4.0 (1.6–9.8)	0.002	3.8 (1.2–11.9)	0.021
Overtime (hours)							
mean (SD)	203	43.3 (39.8)	62.4 (46.1)	1.01 (1.003–1.02)	0.006	1.02 (1.01–1.03)	0.002
Years of service							
mean (SD)	203	9.7 (7.8)	10.7 (7.2)	1.02 (0.98–1.07)	0.298	1.02 (0.9–1.09)	0.453

† Variable omitted due to multicollinearity with years of service. ‡ Variable omitted due to multicollinearity with sex. Values are n (%), or otherwise stated. A logistic regression model was performed to evaluate the contribution of each factor to the leg varicose veins prevalence. Note: Upon stepwise logistic regression, the following variables were significant: female, overweight, obese, standing more than 4 h and overtime; no exercise was near significance of $P = 0.085$. ; BMI, body mass index; CI, confidence interval; OR, odds ratio; SD, standard deviation.

similar. The unadjusted demographical predictors were women, older nurses, long years of service and family history; whereas not exercising, irregular bowel movement, sitting and standing long hours, higher BMI, and overtime work were occupational risk predictors. Upon multivariate analyses, standing for more than 4 h had at least a 2 to 3 risk of developing leg VV (with higher intensity), and per hour increase in overtime work had a 1–2% increased risk. Having no exercise was nearly significant in an exploratory stepwise logistic regression analysis ($P = 0.08$).

DISCUSSION

Despite variation in detection of risk factors, there is little study about varicose veins among nurses especially in Iran. According to the findings, it was identified that 73.9% of participants developed leg VV with varying degrees. Nasiri *et al.* demonstrated a similar result, as they expressed that 62.5% of the working nurses suffer from different degrees of varicose.¹² Whereas, Ziegler and colleagues reported 34% prevalence rate for lower limb chronic venous diseases in the hospital staff.¹⁸ Likewise, Tomei *et al.* showed that 39.28% of industrial workers developed leg varicose.¹⁹ Based on the results of the present study, the incidence of varicose is almost twice in nurses than other professional groups and the general population. In this study, the highest prevalence of varicose intensity was related to telangiectasia which is in consistent with the results of the Nasiri study. Carpentier mentioned that the most severely impaired varicose veins was associated to grade II (C2)⁶; whereas Nasiri introduced telangiectasia far more frequent than other degrees of varicose among nurses, and reported leg oedema (C3) as the most intensified degree.¹² However, in this study, 3.31% of leg varicose cases developed lipodermosclerosis (C4).

The difference seems to be owing to nurses' more years of service and overtime hours in the present study compared with Nasiri's; increase in the overtime hours can be, on one hand, due to lack of workforces in our study. As mentioned before, there is a significant correlation between the female gender and varicose intensity, which is in accordance with Carpentier and Laurikka *et al.* studies.^{1,6} It appears that pregnancy parity is an important factor for increased incidence of VV in women, as multiparous women have the highest prevalence of VV compared with nulliparous ones,³ and varicose are more observed during pregnancy, especially during the first

3 months due to progesterone overproduction.²⁰ In addition, pregnancy is accompanied by several physiological changes such as increased blood volume and subsequent venous dilation, and along with fetal growth, uterine pressure on pelvic vessels, increased weight and abdominal pressure which lead to failure in venous valves and provide the groundwork for varicose veins.²¹ On the other hand, relaxin hormone secretion during pregnancy, which is secreted as a vasodilator to relax the pelvic ligaments and prepare cervix for discharge, contributes to exacerbating pressure on venous valves of lower limbs.²² In the present study, significant correlation was found between the varicose intensity and increasing age or long years of service, which was similar to the investigations,^{1,6} and is probably because of enhanced pressure of surface veins resulting from leg muscle weakness and vascular wall damages following ageing.³ Among other factors shown to have positive relation with varicose intensity in previous studies, increase in BMI can be noted,^{5,6} to which our study findings are similar. Considering that most of our participants were women, it has been indicated in a research that varicose intensity has meaningful relationship with elevated women's BMI, whereas the relationship has not been significant among men, and this could be owed to gender differences.³

In this study, a trend was detected between regular exercises and varicose intensity, and therefore, protective effect of regular exercise might reduce the varicose intensity. In a study by Klonizakis *et al.* on patients with post-operative varicose veins, moderate to high walking was perceived as a strengthening factor for small-vessel inner wall function, and it was also indicated that there is no convincing evidence about increased risk of varicose incidence by long-term exercise.²³ Statistical association between family history and varicose veins and intensified symptoms in the present study are consistent with other investigations,^{5,6,24} although some studies showed no correlation.¹³ Nurses' self-reporting about their family history without physical examination might be responsible for such a discrepancy in our study. In the present research, significant relationship was found between flat feet and VV intensity. Flat feet eventuates in pressure to plantar vessels and nerves, which might be followed by vascular dysfunction, foot coldness, and numbness or sweating. Short back leg muscles are also another complication caused by flat foot.²⁵ In the Kontosic *et al.* and Tomie *et al.* studies, no relationship was seen between varicose creation and flat feet.^{19,26}

This is probably due to differences in the study approach, as flat feet was assessed with varicose intensity in our study, whereas only presence or absence of varicose was evaluated in their survey. According to test results, no significant correlation was observed between bowel movements and varicose intensity. Although one-variable model results showed that regular bowel movements might decrease the varicose risk, which is in accordance with results of the Lee *et al.* study.¹⁵ Like other researches, mean weight augmentation exhibited a noticeable relation with varicose intensity in our study,^{12,15} but no correlation was shown between the average height and varicose intensity, similar to other reports.^{14,15} However, Laurikka *et al.* introduced height increase as a risk factor in varicose creation¹; the reason behind this difference might plausibly be our subjects' higher average height. Another part of the study showed that increased average years of services and overtime hours enhance varicose intensity; in other words, those with more years of service are at higher risk of varicose incidence and intensity.¹²

Like many other studies, significant relationship was detected between varicose intensity and the hours of standing and sitting in the present research,^{2-4,15,27-29} and contrasts with others.^{4,30,31}

Normally, blood hydrostatic pressure along with muscle contraction provides a field for venous blood flow towards the heart, while in standing position; this pressure does not help blood discharge from the veins. Therefore, occupations with long-standing hours can be part of the disorder-intensifying factors.³ The loss of the valvular mechanism in the deep venous system forces the blood to follow abnormal pathways, particularly during standing. In the standing posture or during walking, the muscle pump pushes blood proximally, distally and out through the perforating veins into the superficial system. By increasing venous and capillary pressures, this sequence of events, over a period of many years, leads to chronic oedema, repeated inflammation and, finally, to the post-phlebitic syndrome including stasis ulcers that are difficult to manage and often disabling.³²

Fowkes *et al.* found that sitting was associated with lower rates of venous insufficiency for women but not for men. They also found that walking was a risk factor for women with venous insufficiency when age adjusted, but less so when multiply adjusted, and that walking was related to lessened risk of venous insufficiency in men.⁴

The biological basis for the standing hypothesis is the impeded blood flow and consecutive stasis in veins of the

lower extremities because of increased intravascular hydrostatic pressure in an upright work position. Stasis in the venous system is a key mechanism in venous vascular disease. Stasis increases the risk for coagulation and thrombus formation. The same mechanisms operate during walking, but probably to a lesser degree because the activation of the leg muscle pump during walking might reduce the venous stasis associated with an upright position as long as the venous valves are intact. Once the venous valves are incompetent, walking could actually increase venous pressure in the lower extremities because of a reversal in blood flow.³²

Hard and unsuitable situation among nurses causes ergonomics complications, for instance, VV. On the other hand, as nurses are responsible for main parts of the health system services, and women are the major constituents, while considering the problems of these specific class and regarding that increase in varicose intensity can affect work output and threat to physical and mental health, especially in older ages, as well as imposing a lot of costs to individuals and health-care systems, standard increase in nursing personnel for patient care, reducing working hours and diminishing the pension age seem to be necessary for preventing the prevalence and intensity of such disorder.

Limitations

The sample size used in this study was small. Use of a cross-sectional design limited the ability to explore changes in VV by passing time. Also, we could not determine their lifestyle regarding diet and exercise regime.

Conclusion

The high rate of VV with a variety of grade among nurses in this study is remarkable. Potential interventional lifestyle changes to reduce or prevent VV for new nurses were determined, and it is important to screen existing nurses for this problem early.

DECLARATION OF INTEREST

None.

REFERENCES

- 1 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 Journal of Surgery* 2002; **26**: 648–651.

- 2 Criqui M, Denenberg J, Bergan J, Langer R, Fronck A. Risk factors for chronic venous disease: The San Diego Population Study. *Journal of Vascular Surgery* 2007; **46**: 1–7.
- 3 Beebe-Dimmer JL, Pfeifer JR, Engle JS, Schottenfeld D. The epidemiology of chronic venous insufficiency and varicose veins. *Annals of Epidemiology* 2005; **15**: 175–184.
- 4 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. *International Journal of Epidemiology* 2001; **30**: 846–852.
- 5 Criqui MH, Jamosos M, Fronck A *et al.* Chronic venous disease in an ethnically diverse population. *American Journal of Epidemiology* 2003; **158**: 448.
- 6 Carpentier PH, Maricq HR, Biro C, Ponçot-Makinen CO, Franco A. Prevalence, risk factors, and clinical patterns of chronic venous disorders of lower limbs: A population-based study in France. *Journal of Vascular Surgery* 2004; **40**: 650–659.
- 7 London NJM, Donnelly R. ABC of arterial and venous disease: Ulcerated lower limb. *British Medical Journal* 2000; **320**: 1589.
- 8 Robertson L, Lee AJ, Gallagher K *et al.* Risk factors for chronic ulceration in patients with varicose veins: A case control study. *Journal of Vascular Surgery* 2009; **49**: 1490–1498.
- 9 Ziegler S, Eckhardt G, Stöger R, Machula J, Rüdiger H. High prevalence of chronic venous disease in hospital employees. *Wiener Klinische Wochenschrift* 2003; **115**: 575–579.
- 10 Tüchsen F, Hannerz H, Burr H, Krause N. Prolonged standing at work and hospitalisation due to varicose veins: A 12 year prospective study of the Danish population. *Occupational and Environmental Medicine* 2005; **62**: 847–850.
- 11 Messing K, Tissot F, Stock S. Distal lower-extremity pain and work postures in the quebec population. *American Journal of Public Health* 2008; **98**: 705–713.
- 12 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. *Journal of Birjand University of Medical Sciences (JBUMS)* 2005; **12**: 9–15.
- 13 Callam M. Epidemiology of varicose veins. *British Journal of Surgery* 1994; **81**: 167–173.
- 14 Komsuoğlu B, Gödeli Ö, Kulan K, Cetinarlan B, Komsuoğlu S. Prevalence and risk factors of varicose veins in an elderly population. *Gerontology* 1994; **40**: 25–31.
- 15 Lee AJ, Evans CJ, Allan PL, Ruckley CV, Fowkes FGR. Lifestyle factors and the risk of varicose veins: Edinburgh Vein Study. *Journal of Clinical Epidemiology* 2003; **56**: 171–179.
- 16 Brunickardi C, Andersen D, Billiar T *et al.* *Schwartz's Principles of Surgery*, 9th edn. New York: McGraw-Hill Professional, 2009.
- 17 Raju S, Neglén P. Chronic venous insufficiency and varicose veins. *New England Journal of Medicine* 2009; **360**: 2319–2327.
- 18 Ziegler S, Eckhardt G, Stöger R, Machula J, Rüdiger HW. High prevalence of chronic venous disease in hospital employees. *Wiener Klinische Wochenschrift* 2003; **115**: 575–579.
- 19 Tomei F, Baccolo TP, Tomao E, Palmi S, Rosati MV. Chronic venous disorders and occupation. *American Journal of Industrial Medicine* 1999; **36**: 653–665.
- 20 Zahariev T, Anastassov V, Girov K *et al.* Prevalence of primary chronic venous disease: The Bulgarian experience. *International Angiology* 2009; **28**: 303–310.
- 21 Skott O, Carter AM. Relaxin is a vasodilator hormone. *American Journal of Physiology—Regulatory Integrative and Comparative Physiology* 2002; **283**: R347–R348.
- 22 Dschietzig T, Bartsch C, Richter C, Laule M, Baumann G, Stangl K. Relaxin, a pregnancy hormone, is a functional endothelin-1 antagonist: Attenuation of endothelin-1-mediated vasoconstriction by stimulation of endothelin type-B receptor expression via ERK-1/2 and nuclear factor- κ B. *Circulation Research* 2003; **92**: 32–40.
- 23 Klonizakis M, Tew G, Michaels J, Saxton J. Impaired microvascular endothelial function is restored by acute lower-limb exercise in post-surgical varicose vein patients. *Microvascular Research* 2009; **77**: 158–162.
- 24 Scott TE, LaMorte WW, Gorin DR, Menzoian JO. Risk factors for chronic venous insufficiency: A dual case-control study. *Journal of Vascular Surgery* 1995; **22**: 622–628.
- 25 Sokhangoei Y, Sokhangoei M. *Flat Foot*. Tehran, Iran: Harekat, 2007.
- 26 Kontosic I, Vukelic M, Drescik I, Mesaros-Kanjski E, Materljan E, Jonjic A. Work conditions as risk factors for varicose veins of the lower extremities in certain professions of the working population of Rijeka. *Acta Medica Okayama* 2000; **54**: 33–38.
- 27 Sisto T, Reunanen A, Laurikka J *et al.* Prevalence and risk factors of varicose veins in lower extremities: Mini-Finland health survey. *The European Journal of Surgery* 1995; **161**: 405–414.
- 28 Brand F, Dannenberg A, Abbott R, Kannel W. The epidemiology of varicose veins: The Framingham study. *American Journal of Preventive Medicine* 1988; **4**: 96–101.
- 29 Mekky S, Schilling R, Walford J. Varicose veins in women cotton workers: An epidemiological study in England and Egypt. *BMJ (Clinical Research Ed.)* 1969; **2**: 591–595.
- 30 Maffei F, Magaldi C, Pinho S, Lastoria S, Pinho W, Yoshida W. Varicose veins and chronic venous insufficiency in Brazil: Prevalence among 1755 inhabitants of a country town. *International Journal of Epidemiology* 1986; **15**: 210–217.
- 31 Weddell J. Varicose veins pilot study. *British Journal of Preventive and Social Medicine* 1969; **23**: 179–186.
- 32 Tüchsen F, Krause N, Hannerz H, Burr H, Kristensen T. Standing at work and varicose veins. *Scandinavian Journal of Work, Environment and Health* 2000; **26**: 414–420.