ORIGINAL ARTICLE

PREVALENCE OF CHRONIC VENOUS INSUFFICIENCY IN WORKERS OF THE HOSPITAL DE ALTA COMPLEJIDAD EL CALAFATE IN ARGENTINA

ABSTRACT

Introduction: Chronic venous insufficiency (CVI) is a frequent, yet underdiagnosed condition associated with significant health, social, and occupational impact. Prolonged standing has been identified as a crucial occupational risk factor.

Objective: To estimate the prevalence of symptomatic CVI among healthcare workers at the Hospital de Alta Complejidad El Calafate (Argentina), identify risk factors, and provide evidence for preventive strategies.

Methods: A cross-sectional observational study was conducted between February and April 2024. An anonymous, semi-structured, self-administered digital survey was distributed to all permanent staff (n = 588). Independent variables included sociodemographic, occupational, and clinical factors. The dependent variable was the self-reported presence of CVI symptoms. Logistic regression models were used to assess associations.

Results: A total of 239 valid responses were analyzed (response rate: 40.6%). Participants were predominantly women (74.9%), with a median age of 40 years (interquartile range, 34-47 years). Mean body mass index was 27.9 (standard deviation: 5.27); 27.6% met criteria for obesity, although only 17.6% self-identified as obese ($p < 0.0001$). Significant associated factors included female sex, prolonged standing ≥3 hours, family history of varicose veins, and arterial hypertension. Women reported a higher prevalence of CVI symptoms, as well as higher exposure to hormonal therapy and multiple pregnancies.

Conclusion: The prevalence of CVI symptoms in healthcare workers at a high-complexity hospital was considerable, particularly among women and those with occupational and familial risk factors. These findings support the implementation of preventive measures tailored to high-risk hospital staff.

Keywords: *cross-sectional studies; venous insufficiencies; healthcare workers; occupational health; Argentina.*

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INTRODUCTION

Chronic venous insufficiency (CVI) is defined as the functional inability of the venous system of the lower limbs to return blood, due to abnormalities in the venous wall and/or the valvular apparatus, leading to venous stasis caused by reflux.[1] The Union Internationale de Phlébologie (UIP) considers CVI as the set of changes in the lower limbs produced by sustained venous hypertension, including hyperpigmentation, eczema, lipodermatosclerosis, and ulcers.

Several publications have addressed its health, social, economic, and occupational impact.[2] Prolonged standing has been documented as a key risk factor. In the supine position, venous pressure in the lower limbs is approximately 10 mmHg, whereas in the standing position, it increases to 90 mmHg. While walking, this pressure is reduced to an average of 22 mmHg within fewer than a dozen steps, thanks to the propulsion generated by deep muscle contraction.

Pathophysiologically, prolonged standing prevents the effective activation of the calf muscle pump, thereby favoring sustained elevation of venous pressure and the progressive onset of signs and symptoms of the disease. This biomechanical relationship has led to the identification of certain professions as high-risk groups. In particular, hospital work has been suggested as a predisposing environment.[3]

Several individual and occupational factors have been associated with CVI, including female sex, advanced age, multiple pregnancies, overweight or obesity, sedentary lifestyle, smoking, occupational heat exposure, family history of venous disease, previous deep vein thrombosis, use of hormonal therapy, and chronic constipation.[4-7]

The objective of this study was to estimate the prevalence of symptomatic CVI among workers at the Hospital de Alta Complejidad El Calafate (Argentina), characterize the at-risk population, and contribute evidence for designing preventive strategies.

The hospital, located in the city of El Calafate (Santa Cruz province, Argentina), operates under a tripartite management model (70% national jurisdiction, 25% provincial, and 5% municipal). It belongs to the National Network of High-Complexity Hospitals known as "SAMIC" (Comprehensive Medical Care System for the Community). Its influence extends beyond the programmatic area of its department (Lago Argentino) to the healthcare corridor of the coal basin (Río Turbio and 28 de Noviembre). Moreover, due to its professional development, infrastructure, and technology, it has become a provincial referral center.

MATERIALS AND METHODS

We conducted an observational cross-sectional study to investigate the association between individual and group characteristics and the presence of signs and symptoms consistent with chronic venous insufficiency (CVI) among workers at the Hospital de Alta Complejidad El Calafate (Argentina).

The sample size was estimated based on an expected prevalence of 50% ± 10%, a design effect of 1.5, and different confidence levels. For a 95% confidence level, 125 participants were required; for a 90% confidence level, at least 92 participants were needed. The methodological selection was based on feasibility criteria, drawing on published prevalence data in healthcare personnel. The instrument used was a semi-structured digital survey, validated through a pilot test by expert professionals. A non-response rate of 31.3% was estimated, according to the National Survey on Employment Conditions, Work, Health, and Safety.[8]

The survey was sent to all permanent staff members (n = 588) via institutional email, the same used for salary receipts. A self-administered, anonymous Google form was available from February 11 to April 17, 2024. Participation was also encouraged through WhatsApp and by being present in hospital departments. Temporary or non-listed staff at the time of data collection were excluded.

Independent variables included: age, sex, prolonged standing or sitting without active breaks (≥3 hours), physical activity, exposure to high temperatures, body mass index (BMI), age group, job seniority, organizational division, type of task, family history of varicose veins, arterial hypertension, diabetes, smoking, hormonal therapy, oral contraceptive use, and number of pregnancies. The dependent variable was the self-reported presence of CVI symptoms. Variables such as physical activity (active/sedentary) and pregnancies (0–1 vs. ≥2) were dichotomized following reference criteria.

Measures of occurrence and association were estimated along with their respective 95% confidence intervals (CI95%), and statistical significance tests were performed. Univariate analyses and multivariate logistic regression were performed, including variables with $p < 0.05$ in the previous analysis. Models were evaluated based on their explanatory capacity, as measured by the coefficient of determination (pseudo-R^2), Akaike Information Criterion (AIC), variance inflation factor (VIF), and likelihood ratio test.

The multivariate logistic regression model in the sample was as follows:

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Where:
edad: age
generoVarón: male gender
tres_horasSi: three hours Yes
exp-tempSi: exposition to high temperatures Yes
imc: bmi
antec_fliaresAlMenosUnProgenitorConVárices: family history, at least one parent with varicose veins
antec_fliaresAmbosPadresConVárices: family history, both parents with varicose veins
activ_fisica_biActivo/a: physical activity, active
hta: hypertension

For a graphical representation of the model, a logarithmic scale was used to visualize odds ratios (OR) and 95% CIs symmetrically and comparatively.

The Hospital Research and Teaching Committee evaluated the project. According to the Ministry of Health Resolution 1480/2011, it was classified under exception "B," as individual identification was not possible.[9] Responses were anonymous, and participants confirmed that their data were non-traceable.

Informed consent was voluntary and recorded through exclusive acceptance boxes (Yes/No). In case of refusal, the form submission was blocked.

A sample size calculation was performed using OpenEpi v3.01 (2013). Data processing was conducted using Microsoft Excel (version 16.61) and RStudio (version 4.3.3).

RESULTS

A total of 247 responses were obtained, with a response rate of 42.0% and an effective rate of 40.6%, corresponding to 239 valid responses. This ensured adequate representativeness for the total population of 588 workers, with a confidence level close to 99%, a sampling error of 10%, and a design effect of 1.5.

Of the 239 participants, 176 were women (73.6%) and 63 were men (26.3%). The sample included staff from various areas: administration, kitchen, nursing, pharmacy, sterilization, imaging, surgical instrumentation, physical therapy, laboratory, laundry, housekeeping, medicine, nutrition, dentistry, and other technical services.

A comparison of age groups between the original hospital population (SAMIC) and the surveyed population revealed no significant differences (all p-values > 0.1). However, there was a higher proportion of women responding compared with their representation in the hospital workforce ($p = 0.001$).

The median age was 40 years (IQR: 34–47). The mean BMI was 27.9 (SD: 5.27). A total of 43.5% identified as physically active, 21.8% reported exposure to high temperatures at work, 17.6% had arterial hypertension, 8.4% diabetes, and 22.6% smoked. Among respondents, 17.6% self-perceived as obese, while the prevalence of obesity by BMI was 27.6%. Half of those classified as obese according to BMI did not perceive themselves as such. The association between perceived and measured obesity was statistically significant ($p < 0.0001$).

Regarding family history, 31.4% reported no family history of varicose veins, 51.5% had at least one affected parent, and 17.2% had both parents affected. The median job seniority was 8.4 years (IQR: 3.5-9.1). In terms of organizational departments, 45.2% worked in the Medical Department (DM), 20.1% in the Administration and Operations Department, and 22.6% in the Technical and Care Services Department; the rest were distributed among the Executive Department, the Infrastructure and Technology Department, and the Board of Directors. About physical activity, 24.3% reported high-impact exercise, 43.1% low-impact activity, and 18% weightlifting. A total of 5.9% reported receiving hormonal therapy, and 39.7% had no cardiovascular risk factors.

Table 1 presents the characteristics stratified by gender. Significant differences were observed in family history of varicose veins, job seniority, and use of hormone therapy. Women also showed a higher proportion of no reported physical activity and a higher prevalence of CVI symptoms. Among them, 26.8% reported use of oral contraceptives and 55.9% reported two or more pregnancies.

The overall prevalence of symptoms compatible with CVD was 75.3% (n = 180; 95%CI: 69.8-80.1), significantly higher in women (81.6%; 95%CI: 75.9-87.2) than in men (56.7%; 95%CI: 44.1-69.2), with p <0.001. Symptomatic individuals were older, had a higher BMI, and a greater prevalence of hypertension (*Table 2*). They also showed a stronger family history of varicose veins. A history of ≥2 pregnancies was more frequent among symptomatic individuals, although it did not reach statistical significance ($p = 0.06$). The proportion without CVRFs was lower among those with symptoms (45.8% versus 54.2%).

TABLE 1. Characteristics of participants according to expressed gender (n = 239)

Characteristic	Women (n = 179)	Men (n = 60)	*p*
Age (median, IQR)	40.00 (34.00-47.00)	40.50 (33.00-47.00)	0.907
Family history (n, %)			**<0.001**
No parent with varicose veins	53 (29.6)	22 (36.7)	
At least one parent with varicose veins	96 (53.6)	27 (45.0)	
Both parents with varicose veins	30 (16.8)	11 (18.3)	
BMI (mean, SD)	27.79 (5.62)	28.16 (4.10)	0.636
Seniority (years) (median, IQR)	8.66 (4.97-9.57)	6.69 (2.90-8.80)	**0.016**
Physical activity = Active (n, %)	78 (43.6)	26 (43.3)	1
High-impact activity = Yes (n, %)	40 (22.3)	18 (30.0)	0.306
Low-impact activity = Yes (n, %)	77 (43.0)	26 (43.3)	1
Weightlifting = Yes (n, %)	34 (19.0)	9 (15.0)	0.615
High temperature exposure = Yes (n, %)	39 (21.8)	13 (22.0)	1
Hypertension = Yes (n, %)	33 (18.4)	9 (15.0)	0.682
Diabetes = Yes (n, %)	16 (8.9)	4 (6.7)	0.779
Smoking = Yes (n, %)	41 (22.9)	13 (21.7)	0.984
Obesity = Yes (n, %)	33 (18.4)	9 (15.0)	0.682
Hormone therapy = Yes (n, %)	13 (7.3)	1 (1.7)	0.201
No cardiovascular risk factor (n, %)	61 (34.1)	34 (56.7)	**0.003**
Signs and sSymptoms of CVD = Yes (n, %)	146 (81.6)	34 (56.7)	**<0.001**

Source: Own elaboration.
CVD: chronic venous disease, IQR: interquartile range, SD: standard deviation.

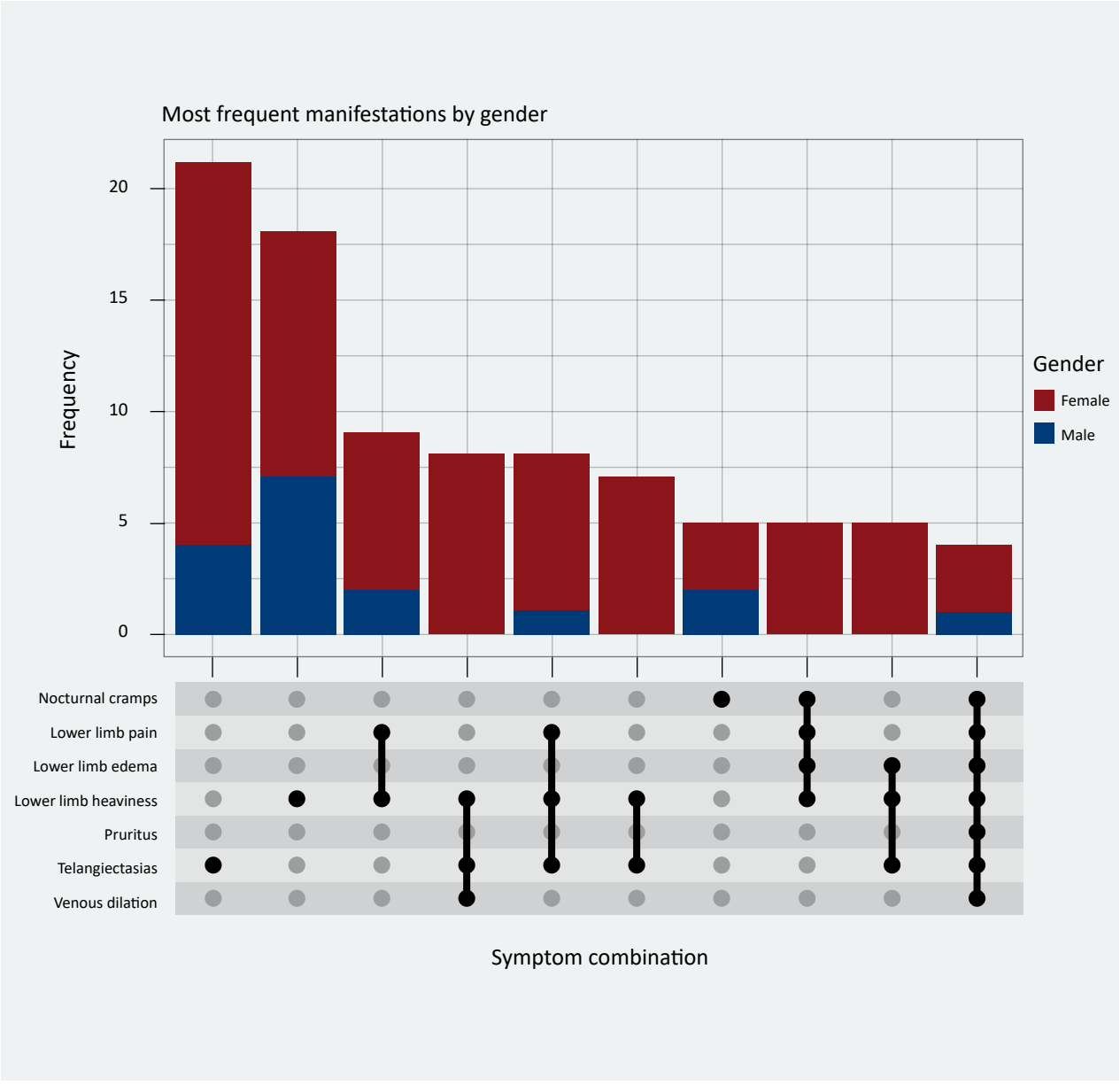
TABLE 2. Characteristics of participants according to the presence of symptoms (n = 239)

Characteristic	Asymptomatic (n = 59)	Symptomatic (n = 180)	*p*
Age (median, IQR)	38.00 (32.00-44.00)	41.50 (35.00-48.00)	**0.008**
Gender = Male (n, %)	26 (44.1)	34 (18.9)	**<0.001**
Family history (n, %)			**<0.001**
No parent with varicose veins	31 (52.5)	44 (24.4)	
At least one parent with varicose veins	25 (42.4)	98 (54.4)	
Both parents with varicose veins	3 (5.1)	38 (21.1)	
BMI (mean, SD)	26.51 (4.13)	28.33 (5.53)	**0.021**
Seniority (years) (median, IQR)	8.17 (3.14-8.96)	8.55 (4.78-9.85)	0.265
Physical activity = Active (n, %)	32 (54.2)	72 (40.0)	0.078
High-impact activity = Yes (n, %)	17 (28.8)	41 (22.8)	0.445
Low-impact activity = Yes (n, %)	27 (45.8)	76 (42.2)	0.745
Weightlifting = Yes (n, %)	11 (18.6)	32 (17.8)	**1**
High temperature exposure = Yes (n, %)	8 (13.6)	44 (24.6)	0.111
Two or more pregnancies = Yes (n, %)	18 (30.5)	82 (45.6)	0.060
Hypertension = Yes (n, %)	2 (3.4)	40 (22.2)	**0.002**
Diabetes = Yes (n, %)	3 (5.1)	17 (9.4)	0.436
Smoking = Yes (n, %)	14 (23.7)	40 (22.2)	0.952
Obesity = Yes (n, %)	6 (10.2)	36 (20.0)	0.127
Oral contraceptives = Yes (n, %)	11 (18.6)	38 (21.1)	0.825
Hormone therapy = Yes (n, %)	1 (1.7)	13 (7.2)	0.211
No cardiovascular risk factors (n, %)	32 (54.2)	63 (35.0)	**0.014**

Source: Own elaboration.
IQR: interquartile range, SD: standard deviation.

The symptoms appeared either in isolation or concurrently, mainly in women (*Figure 1*), with the most frequent combination being pain and heaviness in the lower limbs (LL). Telangiectasias, heaviness in the lower limbs, and nocturnal cramps were the only symptoms that occurred in isolation. Regarding specific symptoms, Figure 1 shows their frequency and co-occurrence.

FIGURE 1. Signs and symptoms of chronic venous insufficiency



Source: Own elaboration.

In the univariate analysis (*Table 3*), the following were significant: age, standing without breaks, BMI, hypertension, and family history. Physical activity showed a protective trend (OR = 0.55), although it did not reach statistical significance (p = 0.074). A history of ≥2 pregnancies and the use of contraceptives were not significantly associated with symptoms.

Among professions, "maintenance staff" showed a lower frequency of CVI (OR = 0.26; 95% CI: 0.09-0.64; p = 0.005), while "kitchen," "nursing," and "medicine" showed ORs >1, suggesting a trend toward a higher risk, although without statistical significance.

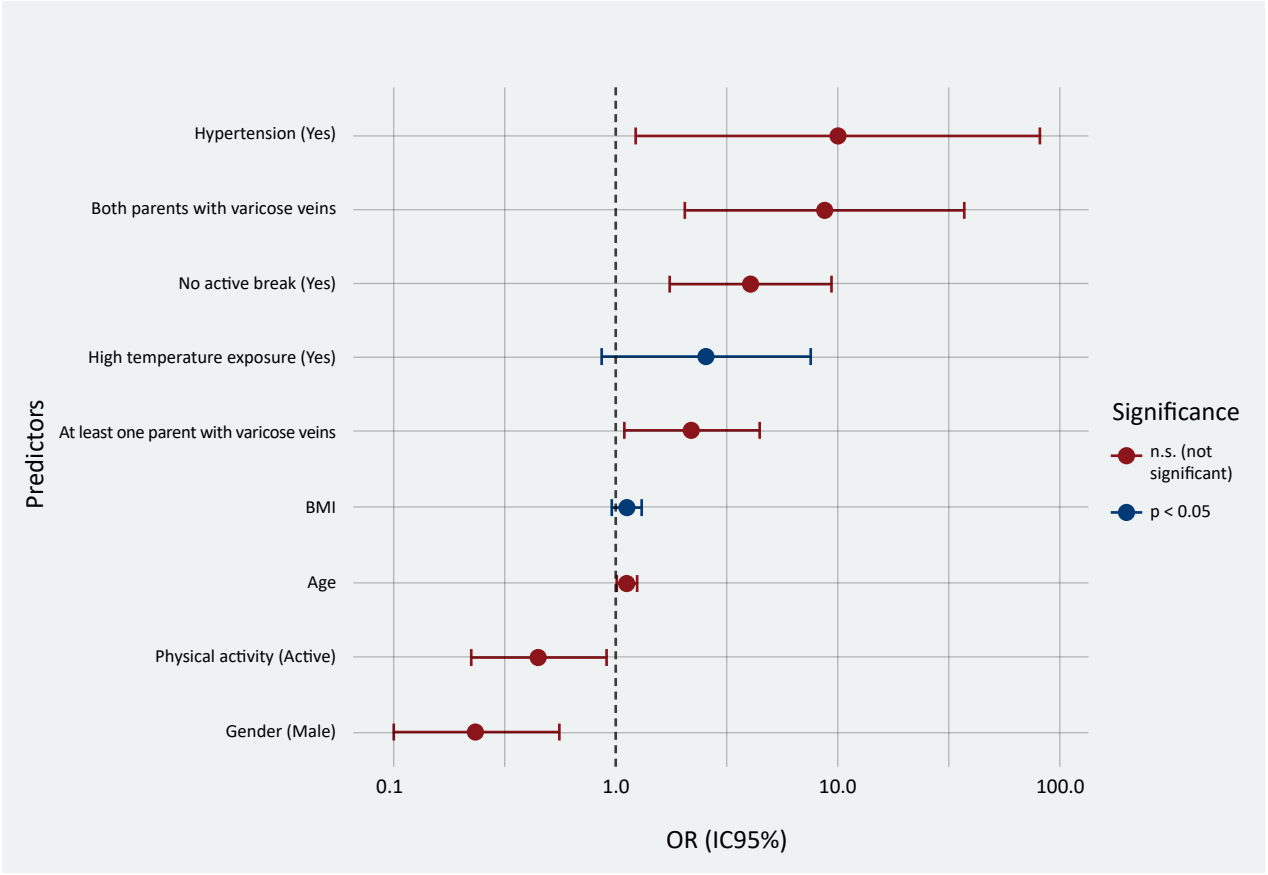
TABLE 3. Univariate regressions in both sexes (n = 239) and in women (n = 176)

	Both sexes			Women		
Predictor	**OR**	**CI95%**	***P***	**OR**	**CI95%**	***P***
Age	1.05	1.01-1.08	**0.001**	1.07	1.02-1.13	**0.005**
Active break = No	3.49	1.87-6.56	**<0.001**	3.5	1.58-7.83	**0.002**
High temperature exposure	2.08	0.96-5.03	0.080	5.19	1.47-33.0	**0.029**
Body mass index	1.08	1.01-1.15	**0.023**	1.10	1.02-1.21	**0.025**
One parent with varicose veins	2.76	1.11-3.39	**0.019**	2.34	1.04-5.30	**0.039**
Both parents with varicose veins	8.92	2.89-39.2	**<0.001**	12.9	2.41-239	**0.016**
Physical activity = Active	0.56	0.31-1.02	0.074	0.71	0.33-1.55	0.390
Hypertension = Yes	8.14	2.39-51.0	0.033	8.50	1.71-154	**0.039**
Job seniority (years)	1.06	1.00-1.13	0.050	1.09	1.01-1.19	**0.032**
Pregnancies (≥2 versus 0 to 1)	–	–	–	1.13	0.52-2.45	0.747
Oral contraceptives = Yes	–	–	–	0.64	0.28-1.49	0.280
Gender = Male	0.30	0.16-0.56	**<0.001**	–	–	–

CI95%: confidence Interval, OR: odds ratio.
Source: Own elaboration.

The multivariate model in both sexes (*Figure 2*) showed that being male was a protective factor (OR = 0.23; p <0.001), while having at least one parent with varicose veins (OR = 2.33; p = 0.028) and having hypertension (OR = 10.08; p = 0.032) were significantly associated with a higher risk. The model explained 39.6% of the variability of the phenomenon (Cragg-Uhler Pseudo-R^2 = 0.396).

FIGURE 2. Chronic venous insufficiency in both sexes (n = 233)



Source: Own elaboration
Note: Predictors with *p* <0.05 are shown in red. Bars represent 95% CI. n.s. = not significant.

DISCUSSION

Chronic venous insufficiency (CVI) among healthcare workers represents a priority field for occupational medicine. Evidence in Argentina remains limited, despite international studies reporting high prevalence in this group. The World Health Organization estimates that nearly 60% of nursing personnel present with CVI of the lower limbs.[10]

According to Benn et al. (2023), the mean prevalence of CVI among healthcare workers is 58.5%, higher than in the general population. In their review of 15 cross-sectional studies, the main associated factors were prolonged standing, female sex, age, obesity, and the nursing profession.[11] In our study, prevalence was even higher (75.3%), possibly due to the symptom-based approach applied. More than 80% of women and over 50% of men reported being symptomatic.

The Edinburgh Vein Study reported a higher age-adjusted prevalence in men (39.7%) than in women (32.2%).[12] Family history was strongly associated with the presence of varicose veins. Despite apparent contradictions with other studies, it has been noted that variables such as context, diet, and ethnicity influence the sex-related differences observed.[13]

In Germany, Kirsten et al. (2021) reported a prevalence of 3.6% in the working population, although differences were observed depending on occupational exposure. Significant factors included age, BMI, family history, physical exertion, and prolonged standing.[14]

In Italy, Rosati et al. (2019) found a high prevalence among nurses (37%) and women, with associated factors similar to those identified in our study: family history and prolonged standing.[15] In Mexico, Silva-Magaña et al. (2023) identified nurses and surgical technologists as particularly vulnerable groups due to their working conditions.[10] In Chile, a previous study noted heat exposure in kitchen areas as an additional risk factor for the development of CVI.[16]

Despite the high prevalence of symptoms, the use of preventive measures remains low. Only 2.7% of healthcare staff reported daily use of compression stockings, despite their proven efficacy.[17]

Our results are consistent with prior literature and provide representative evidence for Argentina. The

association between occupation and CVI risk revealed relevant trends: "janitorial services" appeared to confer possible protection, whereas "kitchen staff," "nursing," and "medicine" showed elevated odds ratios, although not statistically significant. This highlights the need for more targeted studies that consider the workplace environment.

The strengths of this study include the representativeness of the sample and its comprehensive approach to working conditions and risk factors. Limitations include the absence of clinical diagnosis and imaging, as well as the potential underrepresentation of certain occupational groups.

In Argentina, Decree 49/2014 recognizes bilateral varicose veins as an occupational disease when working conditions involve prolonged standing.[18] From a historical perspective, Ramón Carrillo had already emphasized the impact of working conditions as determinants of morbidity.

Considering these findings, implementing preventive programs in hospitals has become crucial. Institutional policies that incorporate education, active breaks, risk factor screening, and provision of physical measures could reduce the burden of venous disease among healthcare workers.

Declarations

The authors declare no conflict of interest.

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