ASSOCIATION BETWEEN OCCUPATIONAL STRESS AND CARDIOVASCULAR HEALTH AMONG INDUSTRIAL WORKERS

Kercya de Almeida Silva Sales[1]
Viviane Soares[2]
Evangelical University of Goiás – UniEVANGÉLICA[12]

ABSTRACT

Introduction: The subjective perception of stress has increased among workers in the industrial sector. Stress is known to impair cardiovascular health and is associated with several cardiovascular diseases. **Objective:** To evaluate the subjective perception of stress and CVS among workers in the industrial sector and compare them according to gender. **Methods:** This is a cross-sectional analytical study conducted with industrial workers. The sample included 82 participants, 32 women (39%) and 50 men (61%). Occupational stress was assessed using the Job Stress Scale (JSS), while cardiovascular health was assessed using the *American Heart Association (AHA)* metrics*,* through *Life Essential 8.* **Results:** There was no association between gender and stress perception (p=0.406). Women use more medication than men (34.4%, p=0.030), but had better systolic blood pressure (SBP) values (∆= -7 mmHg, p=0.014) and better diet quality ((∆= +5 points, p=0.002). There was an association between gender and diet (p=0.003). Most men (22.0%) had low VMS for diet, while women had high VMS for diet (31.3%). **Conclusion:** Women had better results for SBP and diet score, and it is worth highlighting the importance of assessing VMS in industrial workers, which can help establish strategies to encourage proper nutrition and blood pressure control.

Keywords: Industrial workers; Cardiovascular health; Occupational stress.

INTRODUCTION

Stress is a normal physiological reaction in situations of threat or nervousness, that is, it is an action of the body itself to deal with unexpected factors. The subjective perception of stress has increased over the years among industrial workers worldwide, and in Brazil, this reality places the country second in the global ranking of stress levels. [1]In addition to reducing productivity, experiencing high levels of anxiety is associated with impairments in cardiovascular health and an increased risk of cardiovascular disease. [2,3]

The harmonious relationship between the cardiac and vascular systems, with no pathologies, is considered cardiovascular health (CVH).[4] In 2010, seven metrics were established to assess CVH according to the *American Heart Association* (AHA), and in 2022 these metrics were revised and sleep quality assessment was added, resulting in eight metrics called *Life's Essential* 8 (LE8). [(4)]As health prevention and promotion work should be prioritized, LE8 is a tool that addresses most of the risk factors for cardiovascular and c disease, all of which are related to stress. Thus, the objective of this study is to assess the subjective perception of stress and CVH among industrial workers and compare them according to gender.

METHODOLOGY

Sample

This is a cross-sectional analytical study conducted in an industry producing isothermal containers for civil construction, located in the Agroindustrial District of Anápolis (DAIA). The company currently employs 300 workers, distributed across various sectors (white-collar workers in the administrative sector and blue-collar workers in the production process). Employees aged between 18 and 59 years, who had worked at the company for at least six months, were included. Exclusion criteria were chronic or acute exacerbations of heart or lung disease, cognitive impairment, or inflammatory/infectious conditions.

Study design

Recruitment was conducted by invitation, totaling 168 employees; however, only 82 participated in the blood collection. The collections were carried out between July and August 2024. After the procedures were explained, all participants signed the informed consent form (approved by CEP-UniEVANGÉLICA: 6.898.839). First, anthropometric measurements and blood pressure measurements were obtained. Next, questionnaires on perceived stress, physical activity level, food consumption, sleep quality, and smoking were administered. Finally, on another day, blood samples were collected to measure fasting glucose and lipid profile for the calculation of non-HDL cholesterol.

Assessment protocols

Occupational stress was assessed using the Job Stress Scale (JSS) questionnaire, which consisted of 17 items across three domains (demand, control, and social support) with a total score ranging from 0 to 60 points. The subjective perception of total stress was stratified into low and high by the 50th percentile (P50).[5]

CVS assessment followed the AHA recommendations, using eight metrics. Health behaviors included diet [6], physical activity [7], nicotine exposure (current smoker, quit within the last 12 months, quit smoking more than one year ago, or never smoked), and sleep health[8] . Health factors included BMI, non-HDL cholesterol, fasting blood glucose, and blood pressure (BP)[4]. After assigning a score

for each metric, an average was calculated, and cardiovascular health was classified as high (80 to 100 points), moderate (50 to 79 points), and low (0 to 49 points).[4]

Data analysis

The data were described as mean, standard deviation, frequencies, and percentages. Data normality was tested using the *Kolmogorov-Smirnov* test. For comparison between groups, the *Student's t-test* was used for independent samples (normal distribution) and the *Mann-Whitney* test (asymmetric distribution). Delta variation (∆) was calculated as the difference between the means. The Chi-square test was used to associate gender with cardiovascular health metrics. The software used in the analysis was Statistical Package for Social Science (SPSS, version 27.0, IBM, Armont, NY) and Microsoft Excel for graph construction.

RESULTS

Table 1 describes the sample characteristics. The sample consisted of a total of 82 participants, 32 women (39%) and 50 men (61%). Women use more medication than men (34.4%, p=0.030).

Table 1- Sample characterization (n=82).

Variables	**Total (n=82)**	**Female (n=32)**	**Male (n=50)**	**p**
	± mean **± sd**	**Mean±sd**	**Mean±sd**	
Age (years)	32.38± 9.95	31.63±10.55	32.86± 9.62	0.586
Body mass (kg)	78.99± 16.19	73.27± 16.43	82.66± 15.08	0.010
Height (m)	1.71± 0.10	1.63± 0.10	1.75± 0.06	<0.001
	n	**n**	**n**	
Education				
Elementary	07	02 (6.3)	05	
Complete secondary education	24	06	18	
Incomplete high school education	05	01 (3.1)	04	0
Complete higher education	22	11 (34.4)	11	
Incomplete higher education	18	09	09	
Specialization	06 (7.3)	03	03	
Marital				
Single	40	13	27	
Married	35	16	19 (38.0)	0.687
Divorced/separated	02	01 (3.1)	01	
Other	0	02	03	
Type of collar				
White	29	9	20	0.273
Blue	53 (64.6)	23	30	
Workload				
≤40 hours/week	29	12	17	0.746
>40 h/week	53 (64.6)	20	33 (66.0)	
Medication				
Yes	18 (22.0)	11	07 (14.0)	0
No	64	21	43	

*Data for p<0.05.

Regarding CVH parameters, women had better values for SBP (Δ= -7 mmHg, p=0.014) and better diet quality ((Δ= +5 points, p=0.002).

Table 2- Comparison of subjective stress perception and cardiovascular health parameters according to gender (n=82).

Variables	Total (n=82) Mean± sd	Female (n=32)	Male (n=50)	p
Subjective perception of stress				
Demand	8.1±2.38	9.13±2.15	8.78±2.52	0.525
Control	10.46±2.85	10.72±2.89	10.30±2.84	0.520
Social support	8.96±3.06	8.78±2.69	9.08±3.30	0.670
Total score	28.34±5.02	28.63±4.80	28.16±5.20	0.685
Cardiovascular health				
Body mass index (kg/m²)	27.14±5.12	27.63±6.40	26.83±4.15	0.493
Systolic blood pressure (mmHg)	127±17	123±21	130±14	0.014
Diastolic blood pressure (mmHg)	82±12	83±13	82±11	0.665
Diet (points)	28±6	31± 6	26±6	0.002
Level of physical activity				
Vigorous (min/week)	81.95±159.33	53.75±96.34	100±187.73	0
Moderate (min/week)	141.60±229.20	126.13±187.43	151.50±253.67	0.924
Hours of sleep (h)	6.51±1.46	6.73±1.37	6.36±1.52	0.099
Fasting blood glucose (mg/dL)	94.89±14.78	95.38±10.38	94.58±17.11	0.814
Non-HDL cholesterol (mg/dL)	131.38±47.25	125.47±52.80	135.16±43.46	0.368
Cardiovascular health score	68.81± 11.73	70.02± 13.75	68.04± 10.30	0

*Data for p<0.05.

Figure 1 shows the association between gender and cardiovascular health parameters when classified as low, moderate, and high. There was an association between sex and diet (p=0.003). Most men (22.0%) had low CVH for diet, while women had high CVH for diet (31.3%). There was no association between sex and perception of stress (p=0.406).

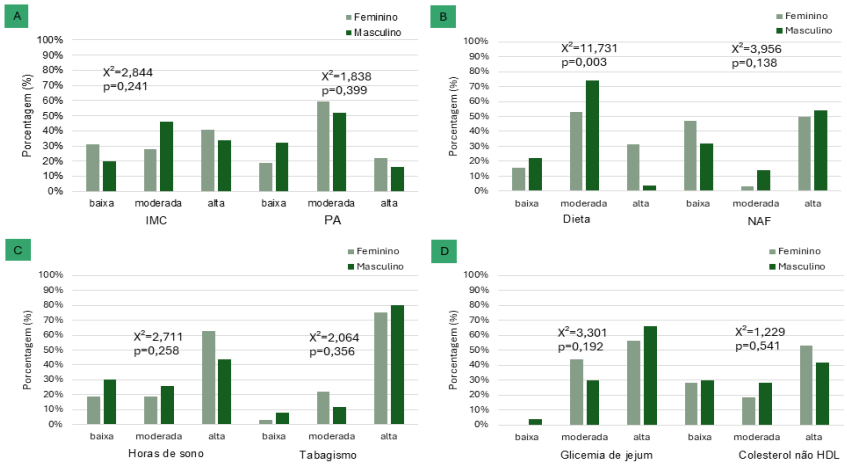

Figure 1- Association between gender and cardiovascular health parameters. **A**. BMI: body mass index and BP: blood pressure. **B**. Diet and NAF: level of physical activity. **C.** Sleep and smoking. **D**. Blood glucose and non-HDL cholesterol. X²= Chi-square test. Data for p<0.05.

CONCLUSION

Occupational stress did not differ between the sexes. Women showed better values for SBP and diet score. In addition, there was an association between sex and diet score, with a higher proportion of women classified as having a high-quality diet. It is worth emphasizing the importance of assessing CVH in industrial workers, as the demand for high productivity and quality makes them susceptible to stressful conditions that are linked to increased risk of cardiovascular events. It is also important to establish strategies to promote adequate nutrition and blood pressure control.

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