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Abbreviations
AC - abdominal circumference
AMI - acute myocardial infarction
BMI - body mass index
BP - blood pressure
CAD - coronary artery disease
CI95% – 95% confidence interval
CVA - cerebrovascular accident
CVD - cardiovascular disease
DBP - diastolic blood pressure
HbA1c - hemoglobin A1C
HC - hip circumference
HF - heart failure
HR - heart rate
LDL - low-density lipoprotein
MAP - mean arterial pressure
OR – odds ratio
SBP - systolic blood pressure
SUS - Sistema Único de Saúde
TSC - total serum cholesterol
WHR - waist-to-hip ratio

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Cardiovascular Risk Factors in Nurses at a Teaching Hospital

Fatores de Risco Cardiovascular em Enfermeiros de um Hospital-Escola

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ABSTRACT

Introdução: As doenças cardiovasculares [DCVs] são responsáveis por grande número de mortes, afastamentos médicos e aposentadorias precoces, especialmente entre os profissionais da saúde, que estão constantemente expostos ao estresse físico e emocional. **Objetivo:** Identificar a prevalência de fatores de risco modificáveis e não modificáveis relacionados às DCVs na equipe de enfermagem de um hospital terciário do interior do estado de São Paulo, Brasil. **Métodos:** Trata-se de um estudo epidemiológico prospectivo-analítico, de natureza quantitativa, realizado em 226 funcionários, em duas etapas: coleta de dados autodeclarados e aferição de dados antropométricos. **Resultados:** Foram observados fatores de risco como histórico familiar de DCVs (82.7%), etilismo (57.1%), sedentarismo (49.1%), tempo de sono insuficiente (27.9%), alto consumo de refeições industrializadas (98.2%) e de bebidas açucaradas (81.7%), entre outros. A partir dos dados antropométricos, foi identificado que 69.4% dos participantes estavam com sobrepeso (38.7%) ou obesos (30.6%) - evidenciados por circunferência abdominal elevada (48.6%) e uma relação cintura-quadril alta (64.0%) - além de 17.1% apresentarem níveis pressóricos indicativos de hipertensão arterial. A maioria referiu não ter o diagnóstico de DCVs (76.1%), contudo, entre aqueles que o tinham, mais da metade (53.7%) não as tratava. **Conclusão:** Observou-se que a prevalência de DCVs não é irrelevante no conjunto avaliado e que há presença de fatores de risco indicando uma tendência de os participantes desenvolverem novas DCVs ou agravarem as já existentes - devido à presença de hábitos nocivos associados a um estilo de vida pouco saudável e à falta de adesão aos tratamentos.

Descriptors: Ocupações em Saúde; Doenças Cardiovasculares; Enfermagem; Fatores de Risco

RESUMO

Introduction: Cardiovascular diseases [CVDs] are responsible for a large number of deaths, sick leave, and early retirements, especially among health professionals, who are constantly exposed to physical and emotional stress. **Objective:** To identify the prevalence of modifiable and non-modifiable risk factors related to CVDs in the nursing team of a tertiary hospital in the interior of the state of São Paulo, Brazil. **Methods:** This is a prospective-analytical epidemiological study, of a quantitative nature, conducted on 226 employees, in two stages: collection of self-declared data and measurement of anthropometric data. **Results:** Risk factors such as family history of CVD (82.7%), alcoholism (57.1%), sedentary lifestyle (49.1%), insufficient sleep time (27.9%), high consumption of processed meals (98.2%) and sugary beverages (81.7%) were observed, among others. From anthropometric data, it was identified that 69.4% of participants were overweight (38.7%) or obese (30.6%) - evidenced by high waist circumference (48.6%) and a high waist-to-hip ratio (64.0%) - in addition to 17.1% who had blood pressure levels indicative of arterial hypertension. The majority reported not having been diagnosed with CVDs (76.1%), however, among those who did, more than half (53.7%) did not treat them properly. **Conclusion:** It was observed that the prevalence of CVDs is not irrelevant in the group evaluated and that there are risk factors indicating a tendency for participants to develop new CVDs or aggravate existing ones - due to the presence of harmful habits associated with an unhealthy lifestyle and lack of adherence to treatments.

Descritores: Health Occupations; Cardiovascular Diseases; Nursing; Risk Factors

INTRODUCTION

According to World Health Organization data from 2021, cardiovascular diseases [CVD] are the leading causes of death worldwide, resulting in the loss of 17.9 million lives per year, which is equivalent to 32% of global deaths. Most of these occurrences (85%) are due to heart attacks and strokes. One third of them affect people under the age of 70[1]. In a study conducted in the city of São José do Rio Preto in 2013, it was identified that CVDs were responsible for a rate of 195.9 deaths for every 100,000 inhabitants, which is equivalent to 31.7% of deaths[2]. Therefore, identifying populations at risk and mitigating modifiable factors, as well as promoting appropriate treatment can help prevent avoidable losses.

Among CVDs, the most prominent are coronary artery disease [CAD], acute myocardial infarction [AMI], heart failure [HF], high blood pressure [BP] and cerebrovascular accident

[CVA]. In this context, they are influenced by risk factors that can be classified as modifiable and non-modifiable. Modifiable factors include hyperglycemia, hyperlipidemia, obesity, sedentary lifestyle, smoking, alcoholism and poor diet; non-modifiable factors include biological sex, age, ethnicity, family history, among others.

Hyperglycemia, particularly in individuals with diabetes, is a significant modifiable risk factor for CVD. Elevated blood glucose levels contribute to the development of atherosclerosis by promoting endothelial dysfunction and inflammatory processes. A study by Sun *et al.* demonstrated that individuals with diabetes have a two-fold increased risk of cardiovascular mortality compared to non-diabetics, emphasizing the importance of glycemic control as a preventive measure[3].

Dyslipidemia, particularly elevated cholesterol and triglycerides, is another critical factor. Hypercholesterolemia has been linked to atherosclerosis, leading to CAD and CVA. Navar *et al.* reported that reductions in LDL cholesterol through statin therapy reduced the incidence of cardiovascular events, underlining the efficacy of lipid management[4]. Furthermore, hypertriglyceridemia has been identified as an independent risk factor for cardiovascular disease, as discussed by Du et al.[5].

Obesity and a sedentary lifestyle are closely linked factors that greatly increase the risk of CVD. The accumulation of adipose tissue, particularly visceral fat, leads to metabolic disturbances such as insulin resistance, dyslipidemia, and hypertension, all of which contribute to atherosclerosis and cardiovascular events. The American Heart Association highlights that obesity, often accompanied by other risk factors like hypertension and dyslipidemia, significantly raises the risk of heart disease. Lavie *et al.* emphasized that both body weight management and increased physical activity led to significant reductions in cardiovascular mortality[6]. Similarly, the harmful effects of excessive alcohol consumption and smoking are well-documented. Studies such as those by Shield et al.[7] and Gaiha et al.[8] have shown their contributions to cardiovascular disease progression through oxidative stress and vascular inflammation.

In this context, CVDs remain a leading cause of morbidity and mortality among healthcare professionals, particularly nursing workers. The high physical and emotional demands of nursing, combined with irregular work hours, stress, and lifestyle factors, contribute significantly to CVD risk. Epidemiological studies have consistently reported a high prevalence of modifiable risk factors in this population. Moraes *et al.* found that nursing students exhibited high rates of alcohol consumption (56.4%), poor dietary habits (49.5%), and stress linked to professional training[9]. Similarly, Duarte-Clíments *et al.* highlighted the burden of sedentary behavior and lack of awareness regarding cardiovascular risk factors among university students in Brazil, suggesting an early onset of unhealthy habits that persist into professional life[10]. More recently, Pereira *et al.* identified a 21.8% prevalence of hypertension and 25.9% of prehypertension among Brazilian healthcare workers, with night shift work, obesity, and long working hours being key contributing factors[11]. Ferreira *et al.* further expanded on these findings, demonstrating that 75.9% of nursing professionals exhibited increased waist circumference, 43.8% were overweight, and 20.4% had diagnosed hypertension, reinforcing the critical need for workplace interventions targeting cardiovascular risk reduction[12].

The present study aimed to obtain data on lifestyle habits, history of CVDs and current clinical status of members of the nursing team of a large teaching hospital in the interior of the state of São Paulo; as well as to identify possible modifiable factors and suggest practices for preventing CVDs.

METHODS

This is a prospective, analytical, and quantitative epidemiological study conducted with nurses from a tertiary hospital in the interior of the state of São Paulo, Brazil (SP). This research received authorization from the nursing department management, was submitted for review by the institution's Research Ethics Committee and obtained approval under code 5.671.736. All participants or their legal representatives were duly informed about the procedures performed and voluntarily agreed to the Informed Consent Form, according to resolution No. 466/12 of the National Health Council. The data obtained were tabulated in Excel v2308 and analyzed in StatsDirect 3.0. Normality of continuous variables was assessed using the Shapiro–Wilk test. Categorical variables were compared using the Chi-square test (χ^2). A 95% confidence interval (CI95%) was adopted, and statistical significance was considered at a level of $\alpha = 0.05$. Additionally, a multivariate logistic regression model was applied to identify independent associated variables of elevated blood pressure, considering age, sex, work hours, obesity, abdominal circumference, waist-to-hip ratio, and heart rate. The results were summarized through descriptive statistics and presented in tables. The research was divided into two phases: (1) collection of self-reported data and (2) measurement of anthropometric data. Individuals under the age of 18 were not included in the study.

In the first stage, potential participants were approached electronically and invited to participate in the study. After accepting the informed consent form, the nurses filled out an electronic form in which data on individual characteristics (sex, age, race, marital status, number of children, city of residence, occupational function); work (length of service at the institution, length of service in the health area, work shift, and number of hours worked); personal history of CVD (diabetes, hypertension, AMI, CAD, varicose veins, hypercholesterolemia, hypertriglyceridemia); and modifiable cardiovascular risk factors (smoking, alcohol consumption, sleep, mental health, sports, and eating habits) were collected. The questionnaire used is found in Appendix 1.

In the second stage, an active search was conducted for some of the participants during working hours, at a convenient time indicated by the sector head, respecting their routines and obligations. At this point, anthropometric data were measured: weight, height, abdominal circumference [AC], hip circumference [HC], heart rate [HR], systolic blood pressure [SBP], and diastolic blood pressure [DBP]. From these data, BMI, waist-hip ratio [WHR], and mean arterial pressure [MAP] were calculated.

RESULTS

In the first stage, 226 nurses provided self-reported data, of which 111 were approached in the second stage and anthropometric data were measured. Regarding gender, a physiopathologically relevant finding was that 90.3% of the sample consisted of females. The Chi-square test indicated a statistically significant difference for this variable ($\chi^2 = 146.6$; $P < 0.0001$). In terms of age, 175 assessments involved individuals younger than 40 years (20 to 39 years), while 51 participants were 40 years or older. The Chi-square test also indicated a statistically significant difference for this variable ($\chi^2 = 68.1$; $P < 0.0001$). Most of the interviewees reside either in the city where the study was conducted (73.9%) or in cities within the same Regional Health Department. Table 1 provides a detailed description of the study population profile.

Table 1. Profile of the study population, São José do Rio Preto, Brazil, 2024.

Professional Characteristics	n	%
Age Range		
20 - 29 years	70	31.0%
30 - 39 years	105	46.5%
40 - 49 years	43	19.0%
50 - 59 years	7	3.1%
More than 60 years	1	0.4%
Gender		
Female	204	90.3%
Male	22	9.7%
Self-declared Skin Color		
Yellow	2	0.9%
White	185	81.9%
Brown	29	12.8%
Black	10	4.4%
Marital Status		
Single	95	42.0%
Stable relationship	29	12.8%
Married	93	41.2%
Divorced	7	3.1%
Widowed	2	0.9%
Number of Children		
None	120	53.1%
1	63	27.9%
2	37	16.4%
3	4	1.8%
4	1	0.4%
5 or more	1	0.4%
Total	**226**	

An analysis of professionals' employment data reveals that 51.8% of participants have less than 10 years of experience in the health sector, with the majority (62.8%) having worked for less than 5 years at the evaluated institution. Regarding work shifts, 65.3% typically work a single shift, with a 6-hour workday being the most common (42.0%).

Concerning non-modifiable cardiovascular risk factors, 82.7% reported having a family member (parents, siblings, uncles, children) with CVD. Specifically, 49.2% of employees' fathers and 50.3% of their mothers were reported to have CVD. The most prevalent in family histories included high BP (77.0%), hypercholesterolemia (43.9%), AMI (42.8%), CVA (39.0%), and hypertriglyceridemia (39.0%).

table 2 presents the prevalence of self-reported CDVs. Among respondents aware of their CVD condition, 53.7% were not undergoing treatment (highlighting that 25% of diabetics also do not treat it). Of those receiving treatment, 80.0% used private health insurance, while 16.0% utilized the Sistema Único de Saúde [SUS] at their workplace institution.

In terms of modifiable cardiovascular risk factors, the majority of participants are non-smokers (91.2%) or former smokers (5.3%). Among those who smoke or have smoked, the smoking history is low (<3 pack-years in 75%). Additionally, 42.9% of participants reported not consuming alcohol, while 54.0% reported drinking up to twice a week, and only 3.1% drank 3 to 5 times a week. A preference for beer was positively correlated with the frequency of alcohol intake (100% of those who drank more than twice per week). Occasional drinkers (up to twice per week) exhibited more diverse preferences, consuming beer (81.1%), wine (45.1%), and spirits (26.2%).

Table 2 – Self-reported Prevalence of Cardiovascular Diseases in Participants, São José do Rio Preto, Brazil, 2024.

Self-Reported Cardiovascular Disease	n	%
No Cardiovascular Disease	172	76.1%
Hypercholesterolemia	21	9.3%
High Blood Pressure	19	8.4%
Hypertriglyceridemia	15	6.6%
Varicose Veins	14	6.2%
Diabetes Mellitus	8	3.5%
Cerebrovascular Accident	1	0.4%
Coronary Artery Disease	1	0.4%
Acute Myocardial Infarction	0	0.0%
Total	**226**	

Still regarding lifestyle habits, the majority reported an adequate average sleep time (72.2% sleep > 6h/night), but more than a quarter of the participants (27.9%) sleep less than 6h per night. Furthermore, on a subjective mental health scale from 1 to 5, 58.0% self-rated their mental health as good (>3). For 70.8% of participants, their mental health status was explained by current work conditions.

A complete sedentary lifestyle was reported by almost half of the participants (49.1%) and 31.0% reported practicing less than 150 minutes of physical activity per week, so that only 19.9% exercised adequately (>150 minutes/week). Among the prevalence of sports practiced among non-sedentary individuals, weight training was the most common modality (53.3%), followed by light walking (<5 km/h; 34.8%), fast walking (>5 km/h; 15.7%), light running (10.4%) and Pilates (9.6%).

Regarding eating habits, only 2.7% are vegetarians; and, among the participants, the majority (90.2%) ate at least 1 serving of fruits, vegetables and legumes per day. More than half (52.7%) used to eat more than 3 servings of red meat per week. The consumption of processed foods is very common: 98.2% of the participants reported eating them at least once a week, while 41.2% eat them 2 to 6 times a week and 12.4% consume them once or more per day. The consumption of sugary drinks (juices, soft drinks, others) is also recurrent: 81.4% consumed at least 1 serving/day, but only 3.5% reported drinking more than 5 servings/day. In a subjective self-assessment of current diet (1 to 5 points), the majority classified themselves as 3 (1: 5.3%; 2: 18.1%; 3: 50.4%; 4: 19.5%; 5: 6.6%).

Participants were stratified based on the anthropometric data collected in the second stage, with the results shown in Table 3. A complete description of all anthropometric data is available in Appendix 2.

As shown in Table 3, among the 111 participants, only 32 (28.83%) had BMI values within the normal range, whereas the expected proportion, based on a realistic estimate, was 70% (approximately 78 individuals with normal BMI). A Chi-square test was conducted to compare the observed and expected frequencies. The result was highly significant ($\chi^2 = 89.60$; $p < 0.0001$), indicating that the proportion of patients with BMI within the normal range was considerably lower than expected, even when assuming a realistic reference proportion of 70%.

Among the 111 patients evaluated, 75 had blood pressure within the normal range, while 36 (32.4%) were diagnosed with hypertension. Considering a tolerable expectation of up to 10% prevalence of hypertension in the target population (corresponding to 11 expected cases), a Chi-square test was performed to compare observed and expected frequencies. The result was highly significant ($\chi^2 = 62.06$; $p < 0.0001$), indicating that the proportion of individuals with hypertension was statistically higher than the acceptable threshold.

Table 3 – Risk Stratification by Anthropometric Data, São José do Rio Preto, Brazil, 2024.

Modifiable Risk Factors	n	%
Weight Stratification (by Body Mass Index)		
Underweight (< 20kg/m²)	2	1.80%
Normal Weight (20 - 25kg/m²)	32	28.83%
Overweight (25 - 30kg/m²)	43	38.74%
Obesity I (30 - 35kg/m²)	21	18.92%
Obesity II (35 - 40kg/m²)	10	9.01%
Obesity III (> 40kg/m²)	3	2.70%
Abdominal Circumference		
Normal (<88cm for women and <102cm for men)	57	51.4%
High (>88cm for women and >102cm for men)	54	48.6%
Waist-to-Hip Ratio		
Normal (< 0.8 for women and < 0.95 for men)	40	36.0%
High (> 0.8 for women and > 0.95 for men)	71	64.0%
Systemic Blood Pressure		
Optimal (< 120 x 80mmHg)	51	45.9%
Normal (< 130 x 85mmHg)	24	21.6%
Borderline (130 - 139 x 85 - 89mmHg)	17	15.3%
Hypertension Stage I (140 - 159 x 90 - 99mmHg)	15	13.5%
Hypertension Stage II (160 - 179 x 100 - 109mmHg)	4	3.6%
Hypertension Stage III (> 180 x 110mmHg)	0	0.0%
Total	**111**	

A multivariate logistic regression analysis was performed to identify independent predictors of elevated blood pressure (systolic ≥120 mmHg and/or diastolic ≥80 mmHg). Among the tested variables, age >40 years and obesity (BMI ≥30 kg/m²) remained statistically significant. For age >40 years, the odds ratio was 2.52 (95% CI: 1.02–6.24; P = 0.0448), indicating that those with hypertension have a 152% greater chance of being in the >40 group than a normotensive person belonging to this age group. Similarly, for obesity, the odds ratio was 3.22 (95% CI: 1.34–7.70; P = 0.0085), indicating that a hypertensive individual is 222% more likely to be obese than a normotensive individual is. These findings suggest that age and obesity are independent predictors of increased blood pressure in this nursing population.

DISCUSSION

The main results of this study highlight several key areas requiring intervention: insufficient physical activity, inadequate diet, lack of sleep, and a lack of proper diagnosis and treatment for CVDs. These findings align with previous research demonstrating a high prevalence of cardiovascular risk factors among nursing professionals.

To contextualize these findings on a global scale, a systematic review by Khani *et al.* analyzed cardiovascular risk factors among nurses worldwide. Their meta-analysis identified sedentary lifestyle as the most prevalent risk factor, affecting 46.3% of nurses. Furthermore, 33.3% of nurses were overweight, and 15.3% were obese - values closely resembling those observed in this study. However, a notable difference was found in alcohol consumption, with Khani *et al.* reporting a prevalence of 24.6%, whereas lower rates were observed in our cohort.

Another significant divergence was noted in the prevalence of hypertension: while the global meta-analysis reported 11.2% of nurses with SBP ≥140 mmHg, our study revealed a slightly higher prevalence. This discrepancy may be attributed to demographic, geographic, and occupational differences in the populations studied[13]. Statistical analysis of the data from the 111 participants showed that, even when considering a 10% prevalence of hypertension as tolerable within the group, the Chi-square test revealed a significant difference ($\chi^2 = 62.06$; $p < 0.0001$). This indicates that the proportion of individuals with hypertension was statistically higher than the acceptable threshold, reinforcing the importance of early screening and intervention strategies for this population.

Recognizing the impact of geographic variability, several studies have assessed cardiovascular risk factors among healthcare professionals in Brazil. The prevalence of stage I and stage II hypertension (17.1%) observed in our cohort is consistent with findings from Pereira *et al.*, who reported similar rates among healthcare workers in high-complexity services in Brazil[11].

Additionally, Ferreira *et al.* highlighted the role of central adiposity, reporting that 75.9% of nursing professionals exhibited increased waist circumference, a well-established predictor of cardiovascular morbidity and mortality[12]. In line with these findings, our multivariate analysis showed that obesity and age over 40 years were independent variables associated with elevated blood pressure. Together, these results reinforce the need for early detection and interventions aimed at weight control and lifestyle modification in this professional group.

Lifestyle factors such as physical inactivity and poor nutrition are widely recognized as key contributors to cardiovascular risk in this population. Moraes *et al.* found that unhealthy dietary patterns and alcohol consumption were prevalent among nursing students, suggesting that these risk factors develop early during academic training and persist throughout professional life[9]. Similarly, Duarte-Clíments *et al.* demonstrated that sedentary behavior and limited awareness of CVD prevention strategies were major concerns among university students, reinforcing the need for structured cardiovascular health programs at the early stages of professional development[10]. Given that our study identified a high prevalence of physical inactivity (49.1%) and poor dietary habits (98.2% consuming ultra-processed foods), workplace initiatives addressing these modifiable risk factors could be highly beneficial.

Occupational stress remains another critical determinant of CVD among healthcare workers. The demanding nature of nursing shifts, particularly night shifts, has been associated with increased rates of hypertension, metabolic disorders, and adverse cardiovascular outcomes. Pereira *et al.* found that shift workers had a significantly higher likelihood of developing hypertension compared to daytime workers, emphasizing the need for strategies to mitigate occupational stress and promote work-life balance[11]. Ferreira *et al.* similarly highlighted the association between long working hours and increased cardiovascular risk, further reinforcing the necessity of hospital policies that support healthier working conditions[12].

Moreover, regional studies in Brazil further corroborate these findings. Magalhães *et al.* assessed cardiovascular risk factors in 165 nursing professionals in Fortaleza, CE, reporting high rates of physical inactivity (64.9%), overweight (56.4%), and increased waist-to-hip ratio (49.7%), as well as a high prevalence of family history of hypertension (72.9%)[14]. Likewise, Ulguim *et al.* examined 45 healthcare workers in Vale do Rio Pardo, RS, identifying high rates of overweight/obesity (55.5%), elevated WHR (73.4%), borderline or high cholesterol levels (88.9%), and occupational stress (55.5%)[15]. Additionally, Ramos *et al.* conducted a cross-sectional study on 188 healthcare professionals in Volta Redonda, RJ, reporting high rates of sedentary lifestyle (83.5%), alcohol consumption (35.6%), hypertension (22.9%), obesity (20.2%), smoking (19.7%), and cholesterol levels above 200 mg/dL

(10.6%)[16]. The high prevalence of elevated BMI in the present study draws attention to the risk of future cardiovascular complications and strongly underscores the need for managerial action to preserve employees' health and ensure the proper functioning of the service.

Beyond the identification of risk factors, it is important to consider possible strategies to address them in professional practice. Strategies such as implementing health promotion programs within the hospital environment, encouraging balanced diets through institutional policies, and promoting flexible work shifts to improve sleep hygiene and reduce stress may have a positive impact. While such proposals are not the primary aim of descriptive studies, the findings can offer important insights for hospital managers and policymakers when designing preventive strategies.

This study aimed to provide a cardiovascular risk profile of the nursing staff in the evaluated institution based on standardized clinical data. However, it did not include laboratory tests, which are crucial for a more comprehensive cardiovascular risk stratification. The observed prevalence of modifiable risk factors - including smoking, alcohol consumption, sedentary behavior, and overweight/obesity - aligns with findings from previous studies. Nevertheless, these studies reported higher prevalence rates of hypertension, hypercholesterolemia, and hypertriglyceridemia compared to self-reported data in our cohort, suggesting that underdiagnosis may be a concern among the participants.

Despite these contributions, some methodological limitations must be acknowledged. First, the voluntary nature of participation may have introduced a self-selection bias, with nurses more aware or concerned about health being overrepresented. Second, the absence of laboratory tests limited the depth of cardiovascular risk stratification. Finally, the predominance of women in the sample reflects the demographic reality of the nursing profession but restricted the possibility of comparing sex-related differences in cardiovascular risk. These aspects should be considered when interpreting the results and highlight the need for future studies with broader and more balanced samples.

CONCLUSION

This study identified a high prevalence of cardiovascular diseases and modifiable risk factors among nursing professionals, including overweight, sedentary lifestyle, poor diet, and low treatment adherence. These conditions suggest not only the current burden of cardiovascular risk but also a potential worsening of outcomes if preventive measures are not implemented. The findings highlight the need for occupational health policies and tailored prevention programs for nurses. Nonetheless, limitations such as self-selection bias, absence of laboratory data, and predominance of female participants must be acknowledged. Future research should incorporate laboratory assessments, address selection bias, and adopt broader longitudinal designs to confirm and expand these results, providing stronger evidence for preventive strategies in this population.

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ATTACHMENTS

APPENDIX 1 - Data collection form

1. What is your full name?
_____

2. And your date of birth?
_____/_____/_____

3. Biological sex:
( ) Male, ( ) Female

4. What color do you identify with?
( ) White, ( ) Mixed race, ( ) Black, ( ) Yellow, ( ) Indigenous

5. What is your marital status?
( ) Single, ( ) Married, ( ) S union, ( ) Divorced, ( ) Widowed

6. How many children do you have?
( ) None, ( ) 1, ( ) 2, ( ) 3, ( ) 4, ( ) 5 or more

7. What is your current city of residence?
_____

8. What is your degree?
( ) Nurse, ( ) Other

9. What is your work sector?
_____

10. How long have you been working at this hospital?
( ) Less than 1 year
( ) 1 year to 5 years
( ) 5 years to 10 years
( ) 10 years to 15 years
( ) 15 years to 20 years
( ) 20 years to 25 years
( ) 25 years to 30 years
( ) More than 30 years

11. And how long have you been working in the health field?
( ) Less than 1 year
( ) 1 year to 5 years
( ) 5 years to 10 years
( ) 10 years to 15 years
( ) 15 years to 20 years
( ) 20 years to 25 years
( ) 25 years to 30 years
( ) More than 30 years

12. What is your work shift?
( ) Morning, ( ) Afternoon, ( ) Full-time, ( ) Night, ( ) Coverage

13. How many hours do you work per day?
( ) 6 hours, ( ) 8 hours, ( ) 12 hours, ( ) More than 12 hours.

14. Do any family members have or have ever had any cardiovascular disease (CVD)?
( ) Yes, ( ) No
a. If yes, which family member(s)?
( ) Grandparents, ( ) Father, ( ) Mother, ( ) Uncles, ( ) Siblings, ( ) Children
b. And which cardiovascular disease(s)?
( ) Stroke - Cerebrovascular accident

( ) SAH - Systemic arterial hypertension
( ) AMI - Acute Myocardial Infarction
( ) HF - Heart failure
( ) DC - Coronary Diseases
( ) VRZ - Varicose veins
( ) CT - High total cholesterol
( ) TG - High triglycerides

15. Do you smoke or have you ever smoked?
( ) Never, ( ) Former smoker, ( ) Smoke

16. How many years have you been smoking or smoked?

_____

17. How many cigarettes do you smoke or used to smoke in a day?

_____

18. On average, how much alcohol do you consume?
( ) I don't drink, ( ) Up to 2 times a week, ( ) 3 to 5 times a week, ( ) More than 5 times a week
a. If you drink, what type(s) of drink(s) do you usually consume?
( ) Beer, ( ) Wine, ( ) Spirits (vodka, cachaça, gin, tequila, whiskey)
b. In general, how much drink do you usually consume at a time?
( ) Up to 2 glasses, ( ) 3 to 5 glasses (one bottle), ( ) More than 5 glasses

19. Do you have diabetes?
( ) Yes, ( ) No

20. If you do, have you been treating for diabetes?
( ) Yes, ( ) No

21. Do you have or have you ever had any cardiovascular disease(s)? Which one(s)?
( ) I have never had any cardiovascular disease
( ) Stroke - Cerebrovascular accident
( ) HAS - Systemic arterial hypertension
( ) AMI - Acute Myocardial Infarction
( ) DC - Coronary Diseases
( ) VRZ - Varicose Veins
( ) CT - High total cholesterol
( ) TG - High triglycerides.

22. Are you following any treatment for cardiovascular disease?
( ) Yes, ( ) No

23. Where do you treat cardiovascular disease?
( ) SUS - city of residence, ( ) SUS - hospital outpatient clinic, ( ) Health insurance, ( ) Private

24. How long do you usually sleep per night?
( ) Less than 6 hours, ( ) 6 to 8 hours, ( ) More than 8 hours

25. How would you rate your mental health today?
Worst 1 ( ) 2 ( ) 3 ( ) 4 ( ) 5 ( ) Best

26. Do you believe that the current state of your mental health is associated with your work occupation?
( ) Yes, ( ) No

27. On average, how much time do you exercise per week?
( ) I do not exercise
( ) I exercise less than 150 minutes (less than 2.5 hours)
( ) I exercise 150 minutes or more (equal to or more than 2.5 hours)

28. What exercise(s) do you practice?
( ) Weight training, ( ) Crossfit, ( ) Pilates, ( ) Light walking (up to 5 km/h), ( ) Brisk walking (more than 5 km/h), ( ) Light running (jogging), ( ) Intense running (more than 16 km/h), ( ) Soccer, ( ) Swimming, ( ) Cycling, ( ) Dancing, ( ) Yoga, ( ) Squash / Tennis/ Beach tennis, ( ) Other intense sports

29. Are you a vegetarian?
( ) Yes, ( ) No

30. How often do you eat fruits, vegetables and legumes? (Does not include juices) *one serving represents one cup of chopped food or 80 grams.
( ) Never, ( ) Rarely, ( ) 1 serving per day, ( ) 2-4 servings per day, ( ) +5 servings per day

31. How often do you eat red meat? *one serving corresponds to 100 grams.
( ) Never, ( ) Less than 2 servings per week, ( ) 3 servings per week, ( ) More than 3 servings per week

32. How often do you eat processed foods?
( ) Never, ( ) Less than once a week, ( ) 2-6 times a week, ( ) Once a day, ( ) 2 or more times a day.

33. How often do you consume sugary drinks such as soft drinks and processed juices?
One serving corresponds to 250ml (1 glass).
( ) Never, ( ) Up to 1 serving per day, ( ) 2 - 4 servings per day, ( ) 5 or more servings per day.

34. How do you consider your diet currently?
More balanced/healthy ( ) 1, ( ) 2, ( ) 3, ( ) 4, ( ) 5 Fattier/unhealthier

APPENDIX 2 - Distribution of Anthropometric Data

Anthropometric Data	N	Avg	CI 95% Max	CI 95% Min	Max	p95	p75	Median	p25	p5	Min
Age	221	34.5	35.6	33.5	67	48	39	33	28	24	23
Age – Female	201	34.5	35.6	33.4	67	49	39	33	28	24	23
Age – Male	20	35.3	38.4	32.1	48.0	46.0	40.5	35.0	30.0	24.0	24.0
Weight	111	77.3	80.4	74.2	114.9	105.4	91.2	74.0	64.4	53.3	43.6
Weight – Female	102	76.1	79.4	72.9	114.9	103.0	88.2	73.4	64.2	53.3	43.6
Weight – Male	9	91.1	99.3	82.9	106.7	106.7	98.4	91.2	87.2	70.5	70.5
Height	111	1.655	1.669	1.641	1.840	1.770	1.700	1.650	1.610	1.540	1.420
Height - Female	102	1.645	1.658	1.631	1.780	1.750	1.690	1.650	1.600	1.540	1.420
Altura - Male	9	1.771	1.803	1.739	1.840	1.840	1.800	1.750	1.740	1.730	1.730
BMI	111	28.165	29.209	27.121	47.475	39.704	31.846	27.233	24.583	20.663	16.914
BMI - Female	102	28.076	29.186	26.965	47.475	39.704	31.446	26.809	24.583	20.663	16.914
BMI - Male	9	29.178	32.508	25.849	35.651	35.651	32.131	29.442	27.233	21.759	21.759
Abdominal Circumference	111	91.4	93.9	88.9	134.0	119.0	101.0	90.5	81.0	73.0	71.0
Abdominal Circumference - Female	102	90.9	93.6	88.3	134.0	119.0	99.0	88.5	81.0	73.0	71.0
Abdominal Circumference - Male	9	97.1	105.1	89.1	110.0	110.0	104.0	98.0	91.0	76.0	76.0
Waist Circumference	111	108.4	110.6	106.3	140.0	130.0	116.0	107.0	100.0	92.0	86.0
Waist Circumference - Female	102	108.6	110.9	106.3	140.0	130.0	116.0	107.3	100.0	92.0	86.0
Waist Circumference - Male	9	106.9	113.7	100.1	120.0	120.0	113.0	105.0	100.0	95.0	95.0
WHR	111	0.842	0.854	0.829	1.047	0.948	0.884	0.838	0.796	0.748	0.674
WHR - Female	102	0.836	0.848	0.823	1.047	0.938	0.879	0.836	0.793	0.748	0.674
WHR - Male	9	0.908	0.948	0.868	0.982	0.982	0.933	0.910	0.894	0.800	0.800
SBP	111	121.8	124.6	119.1	165.0	147.0	131.0	120.0	111.0	103.0	93.0
SBP - Female	102	121.2	124.1	118.3	165.0	147.0	129.0	118.0	111.0	103.0	93.0
SBP - Male	9	129.1	135.3	122.9	144.0	144.0	135.0	126.0	125.0	119.0	119.0
DBP	111	76.3	78.2	74.3	103.0	94.0	83.0	76.0	69.0	59.0	52.0
DBP - Female	102	76.3	78.4	74.2	103.0	94.0	83.0	76.0	69.0	59.0	52.0
DBP - Male	9	75.8	79.9	71.6	82.0	82.0	79.0	78.0	74.0	67.0	67.0
MAP	111	91.5	93.5	89.4	123.7	111.0	99.0	90.3	83.7	74.3	68.3
MAP - Female	102	91.3	93.5	89.1	123.7	111.0	99.0	89.7	83.0	74.3	68.3
MAP - Male	9	93.6	97.6	89.5	100.0	100.0	96.3	94.3	89.0	85.0	85.0
HR	111	80.7	82.7	78.6	109.0	104.0	86.0	81.0	73.0	64.0	61.0
HR - Female	102	80.6	82.7	78.5	109.0	104.0	86.0	80.5	73.0	65.0	61.0
HR - Male	9	81.6	91.4	71.7	99.0	99.0	92.0	82.0	73.0	63.0	63.0