Risk factors for cardiovascular diseases...



# **ORIGINAL ARTICLE**

RISK FACTORS FOR CARDIOVASCULAR DISEASES AND SLEEP QUALITY FATORES DE RISCO PARA AS DOENÇAS CARDIOVASCULARES E QUALIDADE DO SONO FACTORES DE RIESGO PARA LAS ENFERMEDADES CARDIOVASCULARES Y CALIDAD DEL SUEÑO

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#### **ABSTRACT**

Objective: to evaluate the association between risk factors for cardiovascular diseases and sleep quality in university professors. Method: this is a quantitative, transversal, exploratory and descriptive study with 37 university professors. The International Physical Activity Questionnaire (IPAQ) was used to collect personal information with the Pittsburgh Sleep Quality Index (PSQI). Results: obesity prevailed in both sexes (18.9%). Only men (26.8%) reported frequent alcohol consumption. In general, teachers were classified as sedentary and irregularly active (62.1%), in addition to bad sleepers (64.8%), however, men were more active and reported better sleep quality, although they presented a higher risk for CVDs than women. These presented significant correlations. The level of physical activity was positively associated with weight. Sleep quality was positively related to age and negatively to body mass index and diastolic blood pressure. Conclusion: university teachers present a relationship between poor sleep quality and the presence of risk factors for CVD. Descriptors: Cardiovascular Diseases; Risk Factors; Sleep Disorders; Sex; Sleep; Faculty.

#### **RESUMO**

Objetivo: avaliar a associação entre fatores de risco para as doenças cardiovasculares e qualidade do sono em professores universitários. *Método*: trata-se de um estudo quantitativo, transversal, exploratório e descritivo com 37 professores universitários. O Questionário Internacional de Atividade Física (IPAQ) foi utilizado para a coleta de informações pessoais com o Índice de Qualidade do Sono de Pittsburgh (PSQI). Resultados: a obesidade prevaleceu em ambos os sexos (18,9%). Somente os homens (26,8%) relataram consumo frequente de álcool. Em geral, os docentes foram classificados como sedentários e irregularmente ativos (62,1%), além de maus dormidores (64,8%), entretanto, os homens se mostraram mais ativos e relataram melhor qualidade do sono, embora apresentem maior risco para as DCV do que as mulheres. Estas apresentaram correlações significativas. O nível de atividade física associou-se positivamente ao peso. Já a qualidade do sono relacionou-se positivamente à idade e negativamente ao índice de massa corporal e à pressão arterial diastólica. Conclusão: os docentes universitários apresentam relação entre qualidade do sono ruim e presença de fatores de risco para as DCV. Descritores: Doenças Cardiovasculares; Fatores de Risco; Transtornos do Sono; Sexo; Sono; Docentes.

### **RESUMEN**

Objetivo: evaluar la asociación entre factores de riesgo para las enfermedades cardiovasculares y la calidad del sueño en los profesores universitarios. *Método*: se trata de un estudio cuantitativo, transversal, exploratorio y descriptivo con 37 profesores universitarios. El Cuestionario Internacional de Actividad Física (IPAQ) fue utilizado para la recolección de información personal con el Índice de Calidad del Sueño de Pittsburgh (PSQI). Resultados: la obesidad prevaleció en ambos sexos (18,9%). Sólo los hombres (26,8%) reportaron consumo frecuente de alcohol. En general, los docentes fueron clasificados como sedentarios e irregularmente activos (62,1%), además de malos dormidores (64,8%), sin embargo, los hombres se mostraron más activos y reportaron mejor calidad del sueño, aunque presentaban mayor riesgo para las ECV que las mujeres. Estas presentaron correlaciones significativas. El nivel de actividad física se asoció positivamente al peso. La calidad del sueño se relacionó positivamente a la edad y negativamente al índice de masa corporal y a la presión arterial diastólica. Conclusión: los docentes universitarios presentan relación entre la mala calidad del sueño y presencia de factores de riesgo para las ECV. **Descriptores:** Enfermedades Cardiovasculares; Factores de Riesgo; Trastornos del Sueño; Sexo; Sueño; Docentes

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#### INTRODUCTION

Non-communicable chronic diseases are considered one of the major public health problems. In Brazil, cardiovascular diseases represent 30% of deaths, being responsible for many hospitalizations and increasing medical and socioeconomic costs. Infectious and parasitic diseases have declined in recent years, while chronic-degenerative diseases have been growing considerably.<sup>1</sup>

It is known that cardiovascular diseases (CVD) are responsible for a large number of early mortality in adults and, even when they are not lethal, can lead to partial or total disability reducing autonomy and causing serious repercussions for him or his family and society. The Ministry of Health reveals that in all, 283,297 people lost their lives due to circulatory system problems in 2005, the base year of the report, which is equivalent to 32.2% of deaths (which totaled just over one million).<sup>2</sup>

Cardiovascular diseases are characterized by a group of diseases that affect the cardiovascular system and blood vessels.<sup>2</sup> Among them are diabetes mellitus (DM), obesity, systemic arterial hypertension (SAH) and dyslipidemias. These conditions are characterized by a generally multifactorial etiology and deficient state of knowledge about the etiological and pathophysiological mechanisms that lead to its onset and development, which hinders a systematic and coherent intervention in terms of public health. However, epidemiological studies have consistently shown a relationship between certain factors and these diseases.<sup>3</sup>

A number of risk factors are associated with the development of CVD that can be modifiable and non-modifiable. Among the non-modifiable are family history of CVD, age, sex and race. And the modifiable ones include hyperlipidemia, smoking, alcoholism, hyperglycemia, obesity, sedentary lifestyle, poor diet and the use of contraceptives.<sup>4</sup>

It is pointed out that, in addition to these risk factors, there are factors induced by the work environment that have caused several public health problems, especially when associated to the sedentary lifestyle that contributes to deteriorate the worker's quality of life. Technological advances, lack of leisure time, strong psychological pressure, excessive occupational activities, low salaries and difficulties in accessing health care are considered important risk factors for the development of cardiovascular diseases.<sup>5</sup>

It is understood that sleep has an important biological function in thermoregulation,

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memory establishment, regularization endocrine functions, normalization restoration of energy and repair of cerebral metabolism. Due to importance, imbalances in sleep can cause significant alterations in the cognitive, occupational and social functioning individual, besides the considerably reducing the quality of life.6

In addition, the absence of sleep results in considerable changes in the mechanisms of function regulation of cardiovascular facilitating the development of cardiovascular diseases such as venous endothelial dysfunction, increased sympathetic nervous system activity, elevated blood pressure levels, increased appetite and caloric intake, with reduction of the peripheral signal of satiety, which leads to obesity, elevated body temperature, insulin resistance, headache and altered lipid metabolism, among others.7

In view of the information presented, the existence of several risk factors for CVDs (including those induced by the work environment), as well as the alterations that sleep disorders can cause in cardiovascular functioning, can be perceived. Thus, the existence of these risk factors, associated with poor sleep quality among university teachers, may potentiate the onset of cardiovascular diseases, generating consequences that will directly affect their occupational activity and quality of life.

### **OBJECTIVE**

• To evaluate the association between risk factors for cardiovascular diseases and sleep quality in university professors.

# **METHOD**

This is a quantitative, transversal, exploratory and descriptive study carried out from May to September 2016, in the individual study room of Santa Maria College (SMC), located in Cajazeiras / PB, Brazil.

This study was approved by the Research Ethics Committee of the SMC under the Report No. 1,515,932. Participation was confirmed by the signing of the Informed Consent Form, in accordance with Resolution 466/2012 of the National Health Council (NHC).<sup>8</sup>

Data were collected at the General Secretariat of the SMC. The institution has about 180 teachers. Of these, 20% were evaluated, that is, 37 participants, who were included in the research for convenience, of both sexes, aged 25 years and over. Those with chronic diseases (asthma).

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Data was collected through a semistructured questionnaire, prepared by the researchers themselves, with the following information from the participants: identification, personal antecedents such as obesity, SAH, DM and heart disease. We also performed the anthropometric evaluation of each participant: weight and height for the calculation of body mass index (BMI); abdominal circumference (AC); hip circumference (HC) and waist / hip ratio (WHR). The pressure indexes (systolic blood pressure and diastolic blood pressure) were checked. Finally, the International Physical Activity Questionnaire (IPAQ), in its short version, was applied along with the Pittsburgh Sleep Quality Index (PSQI).

Some precepts were followed in the anthropometric evaluation<sup>9</sup>. The cut-off points of BMI adopted were those recommended by the World Health Organization (WHO), that is, low weight (BMI <18.5); eutrophy (BMI 18.5-24.99); overweight (BMI 25-29.99) and obesity (BMI  $\geq$  30.00).<sup>10</sup>

Measurement of AC was performed with a simple and stepped measuring tape in centimeters, being considered risk points for the onset of CVD values greater than 94 cm for men and 80 cm for women. 10-2 The WHR was obtained by the ratio between AC and HC. The WHR values above 0.85 for women and 0.90 for men were commonly associated with higher risks of metabolic alterations related to obesity. 13 For the measurement of blood pressure (BP), the methods proposed by the Brazilian Cardiology Society in 2013 were adopted.

The level of physical activity of the studied population was determined through the IPAQ,

in its short version. For the analysis and classification of the results, the consensus was proposed by the Center of Studies of the Physical Fitness Laboratory of São Caetano do Sul (CELAFISCS), responsible for the coordination of IPAQ in Brazil. Faced with this reference, four levels can be presented: Very Active; Active; Irregularly Active and Sedentary. 14-5

The sleep quality level of the studied population was classified through PSQI. The results were interpreted according to the sum of all scores, with scores ranging from zero to four indicative of good sleep quality; five to ten, poor quality and values greater than ten, sleep disorder. 16-7

Data was analyzed in the SPSS program, version 21. Descriptive statistics were used: relative and absolute frequency, mean, median and standard deviation. In order to correlate variables of cardiovascular risk factors with physical activity and sleep quality, non-parametric Spearman correlation techniques, bisserial correlation, Pearson's chi-square with Yates correction, or Fisher's exact test were used, Mann's test Whitney test and Kruskal-Wallis test with Bonferroni test. A statistical significance of less than or equal to 5% was accepted, that is, p <0.05.

### **RESULTS**

It is recorded that 21 men (56.8%) and 16 women (43.2%) participated in the study, totaling 37 individuals. Table 1 shows that the most common health problem antecedent for both sexes was obesity. It was noticed the absence of women who reported alcohol consumption frequently, whereas 28.6% of the men stated that they use frequently.

Table 1. Description of the antecedents, habits of use of alcohol and tobacco according to sex. Cajazeiras (PB), Brazil, 2016.

Variables	Fer	Female		Male	
	n	%	n	%	
Personal priors					
None	12	75.0	16	76.2	
Obesity	3	18.8	4	19.0	
Systemic Arterial Hypertension	0	0.0	0	0.0	
Diabetes Mellitus	1	6.3	0	0.0	
Cardiac diseases	0	0.0	0	0.0	
Others	0	0.0	0	0.0	
Obesity and Systemic Arterial Hypertension	0	0.0	1	4.8	
Alcoholic beverages					
Does not consume	9	56.3	8	38.1	
Consume alcohol frequently	0	0.0	6	28.6	
Consume alcoholic beverage sporadically	7	43.8	7	33.3	
Smoking					
Smoker	0	0.0	0	0.0	
Ex-smoker	0	0.0	2	9.5	
Never smoked	16	100.0	19	90.5	

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It is noteworthy that men had better levels of physical activity (very active) and good

quality of sleep, as shown in table 2.

Table 2. Description of the level of physical activity and sleep quality. Cajazeiras (PB), Brazil, 2016.

Variables	Fe	Female		Male	
	n	%	n	%	
Sedentary	4	25.0	6	28.6	
Irregularly active	8	50.0	5	23.8	
Active	3	18.8	6	28.6	
Very active	1	6.3	4	19.0	
Sleep quality					
Sleep disorders	3	18.8	4	19.0	
Bad quality of sleep	12	75.0	12	57.1	
Good quality of sleep	1	6.3	5	23.8	

Table 3 shows the differences in the medians of cardiovascular risk factors between the sexes.

Table 3. Description and comparison of risk factors for cardiovascular problems between genders.

Cajazeiras (PB), Brazil, 2016.

Female		Male				
Variables	Average	Standard deviation	Median	Average	Standard deviation	Median
Age (years)	36.19	10.78	32.00	34.48	8.89	33.00
Body mass (kg)	64.63	12.39	64.00*	84.24	18.53	79.00*
Height (cm)	1.60	0.06	1.60*	1.73	0.04	1.73*
Body mass index (kg/m²)	25.18	4.33	24.76*	27.91	5.40	26.77*
Abdominal circumference (cm)	87.00	9.77	86.50*	99.67	13.48	98.00*
Waist-hip ratio(cm)	0.76	0.08	0.75*	0.87	0.07	0.86*
Systolic blood pressure (mmHg)	105.63	13.64	100.00*	120.00	13.03	120.00*
Diastolic blood pressure (mmHg)	69.38	5.73	70.00*	76.67	9.66	80.00*
* <i>p</i> ≤ 0,05.						

The relationships between sleep quality, physical activity level, age, body mass, body mass index, height, waist circumference,

waist-hip ratio, and waist-hip ratio and systolic and diastolic blood pressure are shown in Table 4.

Table 4. Correlation between physical activity level and sleep quality. Cajazeiras (PB), Brazil, 2016.

Variables	Level of physical activity	Quality of sleep
Level of physical activity	-	0.11
Quality of sleep	0.11	-
Age (years)	-0.24	0.02
Body mass (kg)	0.11	0.08
Height (cm)	0.22	0.21
Body mass index (kg/m <sup>2</sup> )	0.06	0.01
Abdominal circumference (cm)	0.02	0.05
Waist-hip ratio(cm)	-0.02	0.29
Systolic blood pressure (mmHg)	0.07	0.05
Diastolic blood pressure (mmHg)	0.01	0.11

The level of physical activity of the female population was positively associated with weight. The quality of sleep showed positive correlations with age and negative correlations with body mass index and diastolic blood pressure. All associations described were statistically significant, according to table 5.

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Table 5. Correlation between physical activity level and sleep quality between genders. Cajazeiras (PB), Brazil, 2016.

Variables	Level of physical	Quality of
	activity <sup>l</sup>	sleep <sup>I</sup>
Female		
Level of physical activity	-	0.37
Quality of sleep	0.38	-
Age (years)	0.04	0.54*
Body mass (kg)	0.49*	-0.28
Height (cm)	0.26	0.19
Body mass index (kg/m²)	0.33	-0.48*
Abdominal circumference (cm)	0.16	-0.16
Waist-hip ratio(cm)	0.23	0.20
Systolic blood pressure (mmHg)	0.25	-0.34
Diastolic blood pressure (mmHg)	-0.15	-0.48*
Male		
Level of physical activity	-	-0.02
Quality of sleep	-0.02	-
Age (years)	-0.35	-0.23
Body mass (kg)	-0.15	0.19
Height (cm)	0.19	0.16
Body mass index (kg/m²)	-0.21	0.20
Abdominal circumference (cm)	-0.14	0.16
Waist-hip ratio(cm)	-0.35	0.18
Systolic blood pressure (mmHg)	-0.22	0.14
Diastolic blood pressure (mmHg)	-0.04	0.25

<sup>&</sup>lt;sup>1</sup> Bisserial correlation.

It is believed that a statistically significant correlation between alcohol consumption and sleep quality was not found. More men and women who use sporadic alcohol have fewer sleep disorders.

### **DISCUSSION**

In this study, we investigated and analyzed the presence of risk factors for cardiovascular diseases in teachers where, among the antecedents of health problems, obesity was the most frequent in both sexes. Taking into account the evaluated women, none reported alcohol consumption frequently. Men do use it often. The majority of the teachers were classified as sedentary and irregularly active, as well as bad sleeping, however, it was observed that the men evaluated are more active and have a good quality of sleep in relation to women.

It was obtained, in the comparison of risk factors for CVD by sex, that men presented a higher risk. In the female group, significant correlations were observed between sleep quality and the level of physical activity and the risk factors for CVD. In men, no significant correlations were found between the aforementioned factors. In the relationship between alcohol consumption and sleep quality, no statistically significant results were found.

It is believed that non-transmissible chronic diseases such as cancer, DM, CVD and SAH represent a group of diseases that are evidenced by the fact that, in general, it takes a long time to progress, irreversible damage, a long period of latency and

complications that may lead to disability or death.<sup>18</sup>

According to the results already described, Carlucci et al.<sup>19</sup> emphasize obesity as a considerable risk factor for the development of chronic diseases, since the increase of body fat leads to organic dysfunctions that are factors of risks. The growth of obesity in Brazil is less pronounced among richer or more educated socioeconomic groups, among women and in the more developed regions of the country.<sup>20</sup>

It is recognized that overweight / obesity has a multifactorial origin, since several metabolic, genetic, behavioral factors (especially eating habits and physical environmental, activity), cultural socioeconomic factors have helped occurrence. Among the teachers, negative behaviors regarding physical activity and nutrition have been verified as the ones with the highest frequency, even in different Brazilian regions. The changes in the occupational conditions of many professional groups, especially the teachers' contributed to the emergence of diseases associated with life habits, among them, obesity.<sup>20</sup>

Sporadic consumption of alcohol was observed in both sexes and consumption was only in males. Alcohol is a harmful element that may favor the emergence of some diseases such hypertriglyceridemia, SAH, non-insulin dependent DM, liver disease, cancer, pancreatitis, encephalopathy, psychosocial and behavioral problems.<sup>21</sup> Its

repetitive and non-moderate consumption causes impairment and can be viewed as an important social disease. It is characterized as a licit drug, without limitations to its consumption, which often leads women and men to its abusive use.

In the present study, <sup>22</sup> the purpose of this study was to describe the prevalence of alcohol abuse in the Brazilian population, according to socio-demographic characteristics of health, which in 13.7% of the population was higher among men in 2013 (21, 6%) in relation to women (6.6%).

It is highlighted in several studies that health is associated with habits and behaviors adopted during life. Thus, irregularity in the sleep pattern and physical inactivity that prevail in the individuals evaluated can cause many repercussions for the human being such as cognitive malfunction, a propensity of alterations in the metabolism and endocrine system and psychological disorders. People who sleep poorly tend to have more morbidities, shorter life expectancy, and early aging.<sup>23</sup>

In a study, <sup>24</sup> results were similar to those obtained in this study, since the evaluation of the practice of physical activities among the teachers who participated in the study indicated the occurrence of 28.3% (n = 83) of "sedentary" (who do not perform any physical activity for ten continuous minutes in the week). Adding the sedentary to the irregularly active, it was observed that more than half (56.6%) of the teachers participating in the research are not active or sedentary. Male teachers (50.0%) were more active than female teachers (38.6%).

It is emphasized that studies show that poor sleep quality presents itself as a risk factor for exacerbation of CVD and may also be a considerable marker of cardiovascular health. There is confirmation of the association between poor quality and duration of sleep with several risk factors, and these in themselves may favor the development of coronary artery disease (CAD), DM, SAH and obesity.

It was found in another study<sup>25</sup> carried out in a grain processing company that 43% of the professionals reported excessive sleepiness during the work period, 51% indicated habitual insomnia in the last year and 11% reported sporadic use of sleeping medicines. Subjectively, the score given by the workers for the quality of their daily sleep had an average of 5.7, on a scale of zero to ten, and 42% reported sleeping less than six hours a day, a context that is related to this research,

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because teachers also reported that their sleep quality is poor.

In addition, another study<sup>26</sup> was carried out, which aimed to verify the relationship between the teaching work process, the conditions under which it develops and the possible physical and mental illness, carried out in a Brazilian federal university, which highlighted the (52.4%), nervousness (31.1%), mental fatigue (55.1%) and insomnia (29.1%), among others.

The mean values of BMI, AC, systolic blood pressure, and diastolic blood pressure were higher in the male group than in the women, but in the median values, AC values were altered in both sexes. At the present time, it is known that central obesity is more associated with metabolic disorders and cardiovascular risks, taking into account that the distribution of body fat and HC greater than 100 cm can, in isolation, increase the risk of DM in 3.5 times, even after controlling for BMI. In turn, the centralized fat is related to the amount of visceral adipose tissue.<sup>27</sup>

It is reported according to BMI standards that although in the median the female group of teachers evaluated was classified as having a normal nutritional status (mean BMI of 24.76 kg / m<sup>2</sup>), it is very close of the borderline value for overweight (25 kg / m<sup>2</sup>). Men were classified above the cutoff point overweight (26.77 kg / m<sup>2</sup>), and corroborate with studies that aimed to determine the prevalence of overweight and obesity, as well as to verify the influence of body mass on the levels of university teachers.<sup>28</sup> Regarding BMI, the majority of teachers were classified as overweight (51.04%), with a significant difference between the sexes. While the majority of women were within normal values (64.3%), about 57.3% of the men were overweight (BMI  $\geq$  25.0 kg /m<sup>2</sup>).

These values are also like those found in a study with teachers from the state school of Jequié (BA), whose objective was to evaluate the prevalence and socio-demographic, occupational and lifestyle factors associated with overweight / obesity. The mean BMI was 24.93 (± 4.38) kg / m2, 26.39 (± 4.14) kg / m2 for men and 24.35 (± 4.36) kg / m2 between the women. The overall prevalence of overweight / obesity was 47.2%.

It was shown that the level of physical activity of the women evaluated in this study had significant and positive correlations with body mass, that is, women with a higher body mass present a better level of physical activity. This may be justified by the findings of another study, <sup>29</sup> which aimed to identify the reasons for the practice of physical

activity and to analyze its relation with body image in adults attending the gym. Among the reasons for the practice of physical activity among women, harmony presented a significant difference. In addition, it was observed that women have dissatisfaction with body image.

In this study, it was evidenced that the quality of female sleep is positively associated with age, that is, the greater the age, the better the quality of sleep. This is related to another study<sup>30</sup> whose results showed that 81.6% of the elderly had good or very good sleep quality. And another study, <sup>31</sup> which used PSQI, obtained results different from those of this study, showing that the elderly present poor sleep quality (69.4%).

It was also observed, in relation to the analysis of sleep quality in the female group, for a significant and negative relation with BMI corroborating other findings, <sup>32</sup> where a negative correlation was found between sleep duration and BMI, since individuals who less than eight hours increased BMI proportionally. Several studies have shown that people who sleep less have a greater chance of becoming obese and that decreased sleep raises the ghrelin / leptin ratio causing increased hunger and appetite. This may be linked to increased caloric intake and the onset of obesity.<sup>33</sup>

Sleep quality and diastolic blood pressure were significantly and negatively related to the female sample, ie, the higher the blood pressure, the worse the quality of sleep and vice versa. The findings of this study are similar to others, where 280 hypertensive patients were evaluated and of these, 156 had poor sleep quality and 106 used sleeping medication.<sup>34</sup> The authors associate these findings with hyperactivity of the sympathetic nervous system and system renin-angiotensin, the elevation of the endothelin-1 / nitric oxide ratio and, especially, the increase in extracellular volume that is present in the pathophysiological mechanisms hypertension and these are closely related to the appearance of sleep disorders.

It is considered that, in the male sample of study, there were no significant associations between sleep quality and physical activity level and risk factors for CVD, however, the level of physical activity is inversely associated with the risk of CVD.35 In addition, studies show that habitual activities, such as walking for more than 30 minutes and climbing stairs, both in a habitual and occupational way, can cause cardiovascular protection and also occupational activities with higher energy expenditure are related to lower rates of deaths due to CVD.

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There were important limitations in this research in relation to the scarcity of studies aimed at the population of university teachers, mainly addressing their sleep quality, as well as their relation with the risk factors for CVD, and also the difficulty to obtain a more due to the limited availability of teachers to carry out.

### CONCLUSION

It is concluded that obesity was observed in both sexes and constitutes an important risk factor for the emergence of chronic noncommunicable diseases, in addition to combining with other health risk factors.

It was observed that, considering all the studied population, that the level of physical activity was low in the evaluated teachers, however, the male sex was more active than the female, according to the criteria established by IPAQ. In the sleep quality analysis, similar results were observed in previous studies where the teachers were classified as bad sleepers. However, in segregating the population, it was seen that men present a better quality of sleep compared to women, according to the parameters of PSQI. Regarding risk factors for cardiovascular disease, it was found that men are at a higher risk for CVD than women.

It is also added that the female group presented significant correlations between the level of physical activity and sleep quality, with some risk factors for CVD. Thus, there is an association between poor sleep quality and risk factors for CVD in university professors.

The need to implement preventive programs and strategies to reduce cardiovascular risks among teachers through changes in lifestyle and recognition of their limitations, as well as new research on the theme to reinforce the associations identified and propose contextualized changes.

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