Original Article

Cardiovascular risk and stress in employees of a higher education institution

Risco cardiovascular e estresse em funcionários de uma instituição de ensino superior

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Objective: to analyze the association between high levels of stress and the frequency of cardiovascular risk factors in employees of a higher education institution. **Methods**: this is a cross-sectional study with 201 employees of a university. A form containing socioeconomic data, the International Physical Activity Questionnaire (short version), the Alcohol Use Disorders Identification Test and the Work Stress Scale were used for data collection. Data analysis was performed using the probability ratio and One-way analysis of variance tests. **Results**: worrisome frequencies of cardiovascular risk factors were identified, in which sedentary lifestyle, excess weight, and increased abdominal circumference presented the most expressive indexes. Regarding the stressors evaluated, some of the employees had increased stress indexes, distributed between the medium and high levels. **Conclusion**: sedentary lifestyle, excess weight, and increased abdominal circumference presented expressive high indexes, without statistically significant associations with the level of stress.
Descriptors: Risk Factors; Cardiovascular Diseases; Burnout, Professional.

Objetivo: analisar a associação entre níveis de estresse elevados e a frequência de fatores de risco cardiovascular em servidores de uma instituição de ensino superior. **Métodos**: estudo transversal com 201 funcionários de uma universidade. Para coleta de dados, utilizou-se formulário contendo dados socioeconômicos, o Questionário Internacional de Atividade Física (versão curta), o *Alcohol Use Disorders Identification Test* e a Escala de Estresse no Trabalho. A análise dos dados foi realizada aplicando os testes razão de verossimilhança e *One-way analysis of variance*. **Resultados**: identificaram-se frequências preocupantes dos fatores de risco cardiovascular, em que sedentarismo, excesso ponderal e aumento da circunferência abdominal apresentaram os índices mais expressivos. Em relação aos estressores avaliados, parte dos servidores apresentou índices aumentados de estresse, distribuídos entre os níveis médio e alto. **Conclusão**: o sedentarismo, excesso ponderal e aumento da circunferência abdominal apresentaram os índices elevados expressivos, sem associações estatisticamente significativas com o nível de estresse.
Descritores: Fatores de Risco; Doenças Cardiovasculares; Esgotamento Profissional.

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Introduction

In the last four decades, the Brazilian population has undergone several changes in its demographic composition, with an increase in life expectancy and the proportion of the elderly people. In a similar way and consequently to the demographic transition, a new epidemiological transition developed, with the reduction of infectious diseases and the increase of chronic non-communicable diseases. Also, along with the two transitions mentioned above, there is nutritional status, with a decrease in malnutrition and an increase in overweight in all ages and income classes[1-2].

At the beginning of this century, the epidemiology of cardiovascular diseases expresses similar behavior to the great endemic diseases in the past centuries. This assertion can be proven by analyzing the World Health Organization's data in 2011, because of the 57 million deaths worldwide in 2008, 30.0% (17.3 million) were due to cardiovascular diseases. It is worth remarking that more than three million of these deaths occurred before 60 years old and they could have been largely prevented[3].

Thus, the scientific community has identified cardiovascular risk factors, seeking to establish actions for prevention, control, and treatment of cardiovascular diseases. In this sense, gender, age, hypertension, smoking, hypercholesterolemia, low levels of high-density level cholesterol, diabetes mellitus, low education, low income, sedentary lifestyle, obesity, hypertriglyceridemia and psycho-emotional stress stand out. This last risk factor seems to be related to the greater reactivity of the cardiovascular system, which contributes to the development of cardiovascular diseases in a significant way[4].

It is important to highlight that the greater the number of risk factors, the greater the likelihood of a person having a cardiovascular event in the future. Also, stress is a very worrying factor causing changes in the functioning of several organs, leading to compromise of various biological functions of the body.

Several publications indicate that cardiovascular risk factors tend to coexist in certain population groups, relating patterns of life and habits to the environment in which they are inserted. In this context, the work environment is an important source of psycho-emotional stress, which raises the number of workers affected by some cardiovascular disease. Thus, preventing, tracking and diagnosing cardiovascular disease risk factors in professionals requires follow-up and implementation of educational strategies to encourage adherence to a healthy lifestyle to reducing and avoiding the complications of these diseases[4-6].

The objective of this study was to analyze the association between high-stress levels and the frequency of cardiovascular risk factors in servers of a public higher education institution.

Methods

This is a descriptive, cross-sectional study carried out from March to May 2015 with employees of a Public Higher Education Institution located in the city of Picos, Brazil.

The sample was constituted by 201 participants, among teachers, administrative technicians, security guards and outsourced employees, active in the institution during the period of data collection. Stratified random sampling was carried out aiming to remove strata proportional to the total population from each professional category. Finally, a drawing was carried out within the strata aiming at choosing the subjects of the sample.

The research participants were personally invited and expressed an interest in participating. Also, the following inclusion criteria were listed: participating in all stages of the research and being properly regularized in the labor issues. As exclusion criteria, pregnant women or employees who were on vacation could not participate.

For data collection, a form containing socioeconomic, lifestyle, clinical and stress data was used. In the socioeconomic evaluation, data were collected on professional category, gender, age group, color/race (self-reported), labor status, economic class and marital status.

In the classification of the level of physical activity, the International Physical Activity Questionnaire short version was used[7] allowing to estimate the time spent per week in different forms of activity and physical inactivity. About alcoholism, the Alcohol Use Disorders Identification Test[8] was used. This instrument assists in the identification of problems related to alcohol use, framing the individual in one of four different consumption patterns: use of low risk, use of risk, harmful use and probable dependence. Regarding smoking, the participants were classified into daily, occasional, ex-smokers and non-smokers.

Blood pressure was determined, following the recommendations and cutoff points described in the VI Brazilian Hypertension Guidelines[9]. Capillary glycemia was evaluated by capillary blood collection obtained through digital pulp puncture and analyzed using an Acon® glycol meter "On Call Plus" model. The collection was performed without the need to respect the participants' fasting, and the glycemic values were classified according to the norms of the Brazilian Ministry of Health[10].

Body mass index was classified according to the recommended indexes of the World Health Organization[11] and waist circumference was classified according to the cut-off points recommended by the Brazilian Diabetes Society[12].

The stress level was classified according to the Work Stress Scale[13], reduced version. This tool is composed of 13 items that represent the main organizational stressors as well as the emotional reactions to them.

The scale, which has an alpha coefficient of 0.85, considers the individual´s perception and, therefore, eliminates gaps in other assessment instruments that address stressors or reactions in isolation. In this way, it has satisfactory psychometric characteristics, being able to collaborate both for research on the subject and for the diagnosis of the organizational environment[13].

The level of stress was given by the average of the affirmatives of the scale, considering the cut-off points (Figure 1).

Cut-off points	Perception	Level of stress
1,00 - 2,00	Strongly disagree and disagree	1 – Low
2,01 - 2,99	Agree in part	2 – Average
3,00 - 5,00	Agree and Strongly Agree	3 – High

Figure 1 - Cut-off points to calculate the level of stress[13]

For data processing and analysis, Statistical Package for the Social Sciences, version 20.0 was used. The analysis of the association between the level of occupational stress and the professional categories occurred through the application of the Likelihood Ratio test. The Kolmogorov-Smirnov test was used to evaluate the normal distribution of the quantitative variables in relation to their means and, for the analysis of the variance of the means referring to the body mass index, waist circumference, systolic blood pressure, diastolic blood pressure and the one-way analysis of variance (One-way ANOVA), with post-hoc Tukey were used. Values of $p < 0.05$ were adopted as the level of statistical significance.

The study complied with the formal requirements contained in the national and international regulatory standards for research involving human beings.

Results

A total of 201 employees were interviewed, more than half were male (53.7%), aged between 21 and 64 years old, with a mean of 35.7±8.9 years old and a higher prevalence in the age range between 21 and 35 years old (61.2%). Most of them self-referred to be of brown skin color (54.2%), having a partner (61,2%) and only work (67,7%), that is, did not study simultaneously, affirming, still, not to develop more than one labor activity. The gross family income of employees ranged from R$ 788.00 to R$ 25,000.00, average of R$ 5000.00 - interquartile range 4718.00 - 38.8% belonged to economic class B2.

Regarding cardiovascular risk factors, 57.7% were overweight, with a mean body mass index of 26.3 ±4.4 kg/m^2, distributed in 41.8% and 15.9% with overweight and obesity, respectively. Regarding waist circumference, 30.3% presented abdominal obesity. Regarding pressure levels, 18.4% and 24.8% had systolic blood pressure and diastolic blood pressure, in this order, above ideal levels. Regarding glycemia, most (94,0%) presented normal values of capillary glycemia at random.

When asked about the practice of physical activities, significant value (69.2%) of sedentary was observed in the sample. No professionals were identified in increased risk areas for alcohol dependence syndrome, and 88.6% were in the low-risk zone. Similarly, 83.5% did not currently smoke. The level of physical activity and smoking rates obtained a heterogeneous distribution among the professional categories.

When analyzing the general average of the level of stress among the employees of the institution of higher education, it was verified that most of the population studied here (58.2%) was classified as low level of stress. On the other hand, 33.8% of the employees had an average stress level, and a portion (8.0%) had a high level of stress.

Table 1 shows the data obtained from the association of occupational stress level and professional categories, with the statistical association (p=0.001), with the category of Effective Professor as the most stressed.

Table 1 - Association of occupational stress level and professional categories

| Variable | Level of stress | | | p* |
| | Low | Average | High | |
	n(%)	n(%)	n(%)	
Professional category				0.001
Effective Professor	27(37.0)	35(47.9)	11(15.1)	
Substitute Professor	17(65.4)	8(30.8)	1(3.8)	
Admnistrative technician	19(59.4)	12(37.5)	1(3.1)	
Outsourced	38(77.6)	8(16.3)	3(6.1)	
Security guards	14(73.7)	5(26.3)	-	
Drivers	2(100.0)	-	-	

*Likelihood Ratio

Regarding the individual evaluation of the stressors in each professional category, the Effective Professor stood out because, of the thirteen evaluated items, they expressed average level of stress in eight, besides presenting a high level of stress with respect to the stressor (13) "Insufficient time to do my workload makes me nervous." Thus, this category showed a total of nine items with increased stress indexes.

About the Substitute Professor class, this group presented increased levels of stress in four items, of which only the stressor (13) "Insufficient time to do my workload makes me nervous" obtained a high average, reproducing the findings related to the class of Effective Professors. Regarding the Administrative Technicians, these presented a medium level of stress in six of the evaluated items. However, this category did not reach averages that could be classified as a high-stress level.

Regarding drivers, four stressors obtained an average of high stress in which two stressors presented a high level of stress. The category of Outsourcers did not have a high level of stress in any of the evaluated items but expressed an average level of stress in three

of them. The Securities presented an increased level of stress in only one stressor, being classified as the least stressed.

The outcome of the analysis of the relationship between cardiovascular risk factors and the stress level of the sample did not have a statistically significant difference. However, for the variables of body mass index, waist circumference, and systolic blood pressure, it was possible to perceive that those with high-stress level also presented higher averages (Table 2).

Table 2 - Analysis of variance of average of cardiovascular risk factors about stress level

Variables	Average	Standard Deviation	F	p*
Body mass index			0.063	0.939
Low	26.27	4.55		
Average	26.17	4.51		
High	26.60	3.49		
Waist circumference			0.565	0.569
Low	90.06	11.79		
Average	88.68	12.63		
High	92.00	14.22		
Systolic blood pressure			0.430	0.651
Low	116.68	15.33		
Average	115.46	14.18		
High	119.25	18.17		
Diastolic Blood Pressure			0.718	0.489
Low	77.91	12.63		
Average	75.66	9.95		
High	77.44	18.58		
Glycemia			0.806	0.448
Low	111.75	39.78		
Average	107.66	24.17		
High	101.50	16.76		

*One-way ANOVA

Discussion

As limitations, the research design does not allow to infer cause and effect among the variables. Therefore, it is necessary to carry out the analysis with comparable methodologies, with similar populations, of other higher education institutions to compare the findings and map the main occupancy overloads.

In this way, intervention research or even strategies coming from the organization may implement measures of prevention and control of cardiovascular risk and stress, increasing the quality of life of the employees and greater achievement in the work.

However, besides the level of stress that affects this population, it could know the main stressors related to the different professional categories. It also enabled relevant and pioneering results in this area, since daily exposure to these stressors can trigger reactions that, together with other cardiovascular risk factors, also found in this research, will contribute to the development of cardiovascular diseases.

Regarding the characterization of the sample, there was a predominance of males, of B economic class and most of the participants of the study did not perform other work activity. A survey carried out with a similar population to investigate the association between cardiovascular risk factors and occupational stress had similar results[14]. Regarding the age, the findings agree with those found in a survey carried out by employees of a higher education institution in São José do Rio Preto, Brazil, whose most frequent age group (37.0%) was 21 to 30 years old[15].

Regarding cardiovascular risk factors, there was a predominance of employees with excess weight and waist circumference increased. Similarly, another study found that 52.76% of the total population were in the overweight or obesity ranges. However, the mean waist circumference was higher[15].

Also, in a study carried out by faculty members of the School of Nursing of the Federal University of Minas Gerais[16], it was found a prevalence of 63.4% for the excess of central adiposity, increasing the risk for cardiovascular disorders, hypertension, and dyslipidemias.

Although the relationship between blood pressure levels and professional categories was not statistically significant, high levels of systolic and diastolic blood pressure were identified in a considerable portion of the sample. These data deserve attention since high blood pressure levels

can trigger complications such as stroke and acute myocardial infarction.

Regarding capillary glycemic, the minimal percentage presented altered glycemic levels, corroborating the findings of a survey carried out by workers from a higher education institution[17]. It is important to highlight that, of the total number of individuals with increased glycemic, only three reported having diabetes mellitus, also claiming to use daily medications for glycemic control. Thus, it was possible to observe that most were not aware of their glycemic state, indicating the need for more detailed analyses of their health status.

Sedentary lifestyle was identified as another important cardiovascular risk factor with a high prevalence among the study population. This is a worrying finding since evidence from epidemiological and experimental studies indicates that regular physical exercise protects against the development and progression of numerous cardiovascular diseases, such as systemic arterial hypertension, obesity, and diabetes[16].

In the current research, the data obtained and classified did not indicate a portion of the sample with abused alcohol used, even though there were some individuals who reported consuming alcoholic beverages. Thus, the relationship between alcohol use and the functional setting was not statistically significant. Although alcohol consumption is culturally accepted by different populations, the ingestion of alcohol for prolonged periods of time may increase blood pressure and cardiovascular mortality in general and in Brazilian populations, excessive consumption of ethanol is directly associated with the occurrence of systemic arterial hypertension[9,15].

As in this study, a very similar percentage (10.9%) of smokers was found in another study[15]. It is important to note that the risk associated with smoking is proportional to the number of cigarettes smoked and the depth of inhalation and that blood pressure and heart rate rise during smoking. Individuals who smoke increase risk for coronary heart disease and stroke.

Among the category of Effective and Substitutes Professors, the first one stood out about the stress levels, since it expressed an average level of stress in eight of the 13 evaluated items. Research carried out in an analogous way found stress values that differed slightly from those found in this research, both regarding stress level and stressors[14,16-18]. Thus, it is possible to infer that, for the teachers, the findings of the stress are not a peculiarity of the institution of higher education, studied here.

Regarding the Administrative Technicians, an investigation carried out with 42 public employees of the National Social Security Institute[19] identified a considerable proportion (61.9%) of the participants with increased levels of stress, diverging among employees analyzed in this research.

The Outsourced and Security guard categories have demonstrated, based on the results obtained, that they are relatively satisfied with their functions, as well as with their respective work environments. However, there was complete dissatisfaction among the category of Drivers, especially regarding the lack of autonomy in the execution of their work and deficiency in the dissemination of information about organizational decisions.

There is a shortage of publications, with analogous methodologies, of these variables. However, in cross-sectional research conducted with urban bus drivers[20], it was found increased levels of stress in 32.1% of the participants.

In this research, no relationship was identified between the presence of cardiovascular risk factors and stress. However, these results do not rule out the possibility that this relationship exists in other populations.

Conclusion

The results indicate that the cardiovascular risk factors exhibited worrying frequencies, and sedentary lifestyle, excess weight, and increased waist circumference presented the most expressive indexes among the risk factors for cardiovascular diseases.

Despite the fact that most of the employees were classified as low stress, a significant portion of them, including the professors, had increased indexes, mainly regarding the lack of information on organizational decisions and the lack of time about the volume of work employees are submitted.

Collaborations

Melo Júnior EB contributed to the design and conception, analysis and interpretation of the data and writing of the article. Moura JRA contributed to the analysis and interpretation of data and article writing. Borges SSL, Araújo AL, and Castro JJV contributed to the design and conception. Silva ARV contributed with the conception and design, relevant critical review of the intellectual content and final approval of the version to be published.

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