

## Factors associated with prehypertension and hypertension among healthcare workers working in high-complexity services

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**Abstract** *The objective was to estimate the prevalence and factors associated with prehypertension and hypertension among health workers who work in high-complexity services for critically-ill and chronic patients. An epidemiological, cross-sectional study was carried out with 490 health workers in the macroregional region of Northern Minas Gerais, Brazil. The dependent variable blood pressure (BP) was categorized as normal BP, prehypertension and hypertension. Multinomial Logistic Regression was used for the multiple analysis. The prevalence of arterial hypertension was 21.8% and that of prehypertension was 25.9%. The chances of developing arterial hypertension and prehypertension were higher in male professionals, aged  $\geq 40$  years, in civil servant workers and those who were obese or overweight. The use of continuous medication and night shift work were associated with hypertension and prehypertension, respectively. The prevalence of arterial hypertension in the group of workers was lower than that of the Brazilian population. It is necessary to carry out studies with workers from this group and investments are required in preventive measures that encourage a change to a healthy lifestyle.*

**Key words** *Prehypertension, Arterial Hypertension, Health worker, Prevalence*

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## Introduction

Arterial hypertension (AH) represents the main risk factor for the development of cardiovascular diseases and mortality worldwide. It is a multifactorial disease, characterized and diagnosed by elevated and sustained blood pressure (BP) levels, of which clinical criterion in individuals over 18 years of age comprises BP levels  $\geq 140$  mmHg  $\times$  90 mmHg<sup>1</sup>.

The World Health Organization (WHO) estimates that approximately 600 million people have AH worldwide, with a global increase of 60% of cases by 2025<sup>2</sup>, in addition to about 7.1 million deaths annually<sup>3</sup>. In Latin America, the prevalence is 30 to 40%, ranging from 25% to 35% according to the region<sup>4</sup>. In Brazil, population surveys have shown a prevalence of 32.3%<sup>5</sup>. A study conducted in China with 29,924 physicians showed a prevalence of 63.9% in this group of professionals<sup>6</sup>. According to this same perspective, an investigation carried out in the African continent estimated the AH prevalence of 52.6%<sup>7</sup>. In Brazil, the mean prevalence of AH in health workers is 20.8%, ranging from 12.7% to 28.9% according to some prevalence surveys<sup>8-11</sup>.

There are several factors responsible for the development of the disease. Among them are the behavioral ones, such as an unhealthy diet, obesity, physical inactivity, alcohol and tobacco consumption. However, work-related factors such as stress and shift work/night work have also been implicated in the etiology of hypertension<sup>12</sup>.

Therefore, the work environment definitively influences the worker's health. Thus, health workers who work in high-complexity services, such as hemodialysis, oncology, emergency department and intensive care units, have daily contact with stressful situations, such as other people's pain, tragedy, and suffering, as well as the fine line between life and death<sup>13</sup>. Moreover, the nature of the work in these services requires continuous assistance to patients, compliance with strict rules, routines and regulations, fragmented activity division, hierarchical rigidity and insufficient human resources. Together, these factors generate a high load of exhaustion and physical and emotional stress, increasing the risk of developing AH<sup>14</sup>. Therefore, in addition to the direct and indirect costs, this disease results in situations such as absenteeism, loss of working hours or work abandonment among health workers<sup>10</sup>.

Workers' health represents an area of knowledge that correlates the interfaces of work, health,

disease and their consequences, thus evidencing a public health issue. The prevalence of prehypertension and AH in health workers has been studied for a few decades and, therefore, further investigations are required on the health and working conditions of professionals who work specifically with critically-ill and chronic patients and the association with the disease. What demonstrates the relevance of this study is the need to expand the research on the disease and its factors associated with this group of professionals, aiming to identify the factors, improve health and working conditions and job satisfaction, which may consequently reflect directly on the quality of care provided to the patient. Therefore, the present study aimed to estimate the prevalence and factors associated with prehypertension and arterial hypertension among health workers who work in high-complexity services for critically-ill and chronic patients.

## Methods

This was an epidemiological, cross-sectional and analytical study carried out with health workers from hemodialysis, oncology, emergency room and neonatal intensive care units in nine hospitals in the macro-region of Northern Minas Gerais, Brazil. The total study population consisted of 910 professionals, represented by nursing assistants/technicians, nurses, pharmacists, physiotherapists, physicians, nutritionists and psychologists, who provided direct assistance to patients. The research group, from which this study originated, has 'compassion fatigue' as its main research axis, which is a little explored event in the scientific sphere.

The sample size was established aiming to estimate population parameters with a prevalence of 50% (to maximize the sample size and due to the fact that the project contemplates several events), a 95% confidence interval (95%CI) and an accuracy level of 5.0%. A 20-percent addition was established to compensate for possible non-responses and losses. The calculations showed the need for a sample size of at least 450 health professionals. For the sample calculation, a simple random sampling with replacement was used, utilizing the Excel for Windows® software.

This sample size allowed the identification of a minimum prevalence ratio equal to 2.0, with a confidence level of 95%, power of 80% and an unexposed/exposed ratio of 2:1 for the gender variable.

Sample selection was performed based on the simple random sampling technique with replacement. All workers with more than six months of experience in the abovementioned services were included in the study, and professionals on medical leave or on vacation at the time of data collection were excluded.

Calibration was performed using the parameters of reliability and reproducibility, regarding the measurement of blood pressure levels, weight, height and waist circumference values. The examiners performed the measurements in triplicate for each of the aforementioned variables in a group of 20 volunteers consisting of nursing students. The measurements were compared two by two, using the intraclass correlation coefficient (ICC). In this study, the intra-rater ICC was  $ICC \geq 0.61$  (satisfactory) for all variables, and the inter-rater ICC was  $ICC \geq 0.5$  (satisfactory) for systolic and diastolic blood pressure measurements;  $ICC = 1$  (perfect agreement) for weight and height measurements and  $ICC \geq 0.89$  (satisfactory) for waist circumference<sup>15</sup>.

Data related to the dependent variable (BP) and the following independent variables were also analyzed: sociodemographic (gender, age, marital status and economic class), anthropometric (weight, height and waist circumference), biochemical (fasting blood glucose (FBG), triglycerides (TG), total cholesterol (TC), high-density lipoprotein cholesterol (HDL-c) and low-density lipoprotein cholesterol (LDL-c)), working conditions (sector, time in the profession, job function in the sector, workload, employment relationship, work shift, number of work contracts and medical leave due to occupational stress, depression or anxiety), lifestyle (physical activity practice, consumption of fruits and vegetables, smoking status, alcohol consumption, sleep and use of psychotropic medication), physical health conditions (type of access to health services, previous diseases, use of continuous medication and self-perception of health), mental health conditions (symptoms of anxiety, stress at work, symptoms of depression, internet addiction and quality of life).

Data collection took place from January 2017 to April 2018, using a self-applied questionnaire, with measurement of the anthropometric data and blood collection for the biochemical analysis.

For data collection of the dependent variable, the guidelines of the 7<sup>th</sup> Brazilian Guidelines on Arterial Hypertension were followed, and the validated device Pulse Control (HEM-6123) Automatic Blood Pressure Monitor - Omron® was

used<sup>1</sup>. BP measurements were obtained when the workers were approached and handed the questionnaire, and also at the time of the collection of anthropometric data and blood samples. Three measurements were made on each occasion. The mean of the last two measurements was considered for the statistical analysis, disregarding the first measurement. The blood pressure levels of the participants were classified as normal, for systolic blood pressure (SBP) level  $\leq 120$  mmHg and  $\leq 80$  mmHg for diastolic blood pressure (DBP), as prehypertension, for mean SBP values from 121 to 139 mmHg and between 81 and 89 mmHg for DBP, and as hypertension, for those with mean SBP values  $\geq 140$  mmHg and DBP  $\geq 90$  mmHg and for professionals who reported continuous use of antihypertensive medication, regardless of the measured BP values. Hypertension was further classified as stage 1 hypertension (SBP between 140 and 159 mmHg and DBP between 90 and 99 mmHg); stage 2 hypertension (SBP and DBP values of 160 to 179 mmHg and 100 to 109 mmHg, respectively); and stage 3 hypertension (SBP  $\geq 180$  mmHg and DBP  $\geq 110$  mmHg). When SBP and DBP were located in different categories, the highest measure was used to classify the BP<sup>1</sup>.

The biochemical variables glucose, total cholesterol, HDL-cholesterol, LDL-cholesterol and triglycerides were collected in a single sample through antecubital venous blood after 12 hours of fasting, with laboratory analysis using the enzymatic colorimetric method, in a Labmax Plenno® device. For the reference value of cholesterol, HDL-cholesterol, LDL-cholesterol and triglycerides, those recommended by the Brazilian Guideline on Dyslipidemia and Prevention of Atherosclerosis<sup>16</sup> was used, according to which the following were classified as desirable or undesirable, respectively, Cholesterol ( $< 190$  mg/dL and  $\geq 190$  mg/dL), LDL-cholesterol ( $< 130$  mg/dL and  $\geq 130$  mg/dL), HDL-cholesterol ( $> 40$  mg/dL and  $\leq 40$  mg/dL) and triglycerides ( $< 150$  mg/dL and  $\geq 150$  mg/dL). The reference values of the Guidelines of the Brazilian Society of Diabetes<sup>17</sup> was used for glucose, which considers fasting blood glucose  $< 100$  mg/dL as normal and blood glucose  $\geq 100$  mg/dL as altered.

During the procedure for the collection of anthropometric variables, the Body Mass Index (BMI) was determined by the weight (in kilograms) and height (in meters) measured using a digital electronic scale and a stadiometer. The professionals were classified according to the WHO<sup>18</sup> criteria as underweight ( $< 18.5$  kg/m<sup>2</sup>), normal weight (18.5 to 24.9 kg/m<sup>2</sup>), overweight

(25 to 29.9 kg/m<sup>2</sup>) and obese ( $\geq 30$  kg/m<sup>2</sup>). To determine the abdominal circumference, an inelastic measuring tape with a precision of 0.1 centimeter adjusted to the body was used, being considered normal a circumference value  $\leq 80$  cm for women and  $\leq 90$  for men, whereas values  $> 80$  cm for women and  $> 90$  cm for men were considered altered<sup>18</sup>. The waist-to-height ratio (WHtR) was defined by dividing waist circumference (cm) by height (cm). A ratio  $\leq 0.54$  for men was considered normal and a ratio  $> 0.54$  was considered altered. For women, the ratio  $\leq 0.55$  and  $> 0.55$  was considered normal and altered, respectively<sup>19</sup>.

The sociodemographic variables, physical health conditions and working conditions were assessed using a form prepared by the project team. To investigate the variables related to lifestyle, the instrument validated in Brazil "Fantastic Lifestyle Questionnaire" was used, which considers the behavior of individuals in the last 30 days<sup>20</sup>. This study used only the questions of interest that encompassed aspects of the variables related to the practice of physical activity, diet, smoking status, alcohol consumption and sleep.

Variables relevant to mental health conditions and quality of life were measured using instruments validated in Brazil: Beck Anxiety Inventory<sup>21</sup>, Beck Depression Inventory<sup>21</sup>, General Work Stress Scale<sup>22</sup>, Internet Addiction Test<sup>23</sup> and the WHOQOL-BREF<sup>24</sup>, respectively.

Since no theoretical model was identified that contemplated the potential influence of socio-demographic characteristics, lifestyle, physical, mental, and working health conditions, anthropometric and biochemical measurements on AH in health workers who attended to critically-ill and chronic patients, a model was proposed, which was built after extensive literature review, addressing the topic and based on a previous model<sup>25</sup>. This model establishes the hierarchical grouping of variables at the distal, intermediate and proximal levels (Figure 1) according to the interaction of these levels in the development process of the expected outcome, *i.e.*, arterial hypertension. The distal level consisted of sociodemographic variables; the intermediate level consisted of variables related to lifestyle, working conditions, physical health conditions, mental health conditions; and the proximal level included anthropometric and biochemical variables<sup>26</sup>.

The data were entered in duplicate, organized and analyzed using the statistical software Statistical Package for Social Sciences (SPSS®) for Windows, version 23.0. The investigated

variables were described through their absolute and percentage frequency distribution. Then, a bivariate analysis was performed between the outcome variable (blood pressure) and each independent variable using the chi-square test with robust variance, in which the variables with a descriptive level of  $p \leq 0.25$  were selected for the multiple analysis.

In the multiple analysis, the Multinomial Logistic Regression model was used, and the outcome was categorized into three groups: normal, prehypertension and hypertension, with professionals being classified as having hypertension stages 1, 2 and 3 in this last group. Odds Ratio with 95% confidence intervals and  $p \leq 0.05$  were estimated. In this model, the "normal" category of the blood pressure variable was considered as the reference category. The goodness-of-fit of the model was adequate (Deviance Test  $p = 0.620$ ) and this result explained 28.9% of the outcome variability (Pseudo-R<sup>2</sup> = 0.289).

The study complied with the ethical principles of the National Health Council (*Conselho Nacional de Saúde - CNS*) Resolution No. 466/2012 and the research project was approved by the Research Ethics Committee of Universidade Estadual de Montes Claros. All participants signed the Free and Informed Consent Form (FICF).

## Results

A total of 490 health workers participated in the study, most of them female (65.9%), aged between 30 and 39 years (68.6%). Regarding the lifestyle, most professionals practiced physical activity less than 3 times a week (63.9%), reported preserved sleep quality (55.8%), did not consume alcohol and tobacco (53.2% and 97, 3%, respectively).

Regarding the working conditions, more than half of the interviewees had been working in the health area for less than 10 years (52.9%), mostly nursing assistants/technicians (66.3%), working less than 44 hours/week (56.5%) and had only one job (63.1%). It was observed that 10.6% of professionals had moderate/severe symptoms of anxiety; 97.2% were considered mild internet addicts. Regarding the anthropometric variables, 64.2% had elevated waist circumference and 40.9% were classified as overweight. As for the biochemical variables, more than half of the professionals had levels considered adequate for cholesterol (58.4%), LDL-cholesterol (67.4%),

HDL-cholesterol (53%) and triglycerides (69.9%), and blood glucose was considered normal in 87.1% of the professionals.

The prevalence of AH among health workers was 21.8% [21.3%-29.3%] and that of prehypertension was 25.9% [17.8%-25.8%]. Table 1 shows the classification of blood pressure stages in the professionals.

Concerning the bivariate analysis, when analyzing the association of the disease in the studied population with the study variables, it was observed that gender ( $p<0.001$ ), age range ( $p=0.001$ ), marital status ( $p=0.216$ ), consumption of fruits and vegetables ( $p=0.241$ ), smoking status ( $p=0.056$ ), sleep ( $p=0.105$ ), time working in the profession ( $p=0.002$ ), work shift ( $p<0.001$ ), employment relationship ( $p=0.001$ ), medical leave ( $p=0.244$ ), number of employment contracts ( $p=0.250$ ), symptoms of depression ( $p=0.203$ ), quality of life: psychological domain ( $p=0.232$ ), WC ( $p=0.002$ ), BMI ( $p<0.001$ ), WHtR ( $p<0.001$ ), Total Cholesterol ( $p=0.016$ ), LDL-Cholesterol ( $p=0.112$ ), Triglycerides ( $p=0.007$ ) and Blood Glucose ( $p=0.016$ ) were significant at the 25% level.

Table 2 shows the results of the multiple analysis for the prehypertension and hypertension categories of the outcome variable, using the normal category as a reference. Male gender (OR=3.1; CI: 1.9-5.1), age (OR=2.6; CI: 1.3-5.0),

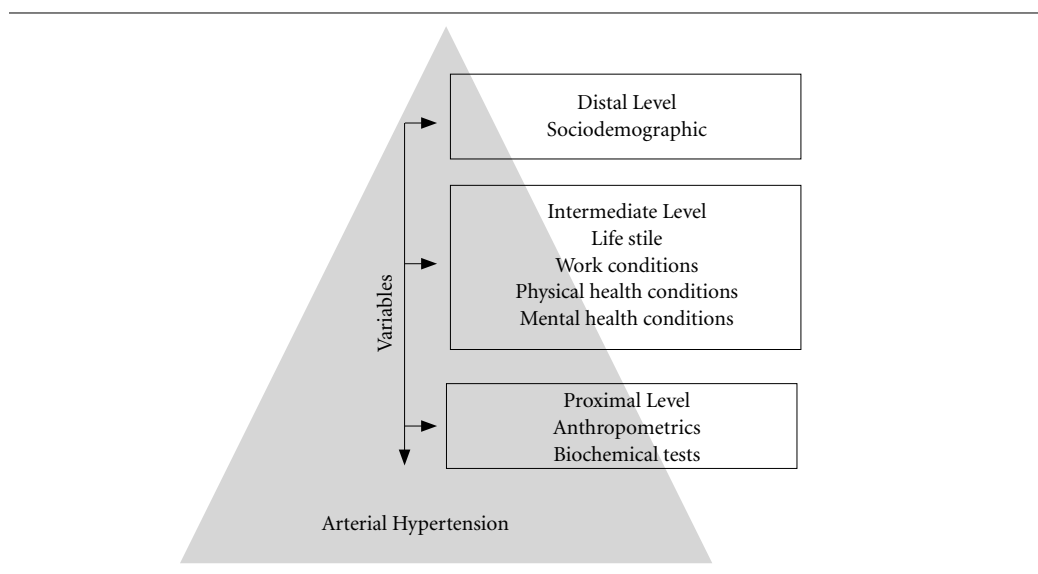
civil servants (OR=2.3; CI: 1.1-4.7), use of continuous medication (OR=2.7; IC: 1.5-5.0), were associated with AH at the distal level, (OR=2.7; CI: 1.5-5.0); and at the proximal level, overweight and obesity (OR=3.1; CI: 1.6-6.1 and OR=8.3; CI: 3.8-18.1, respectively). Male gender (OR=2.7; CI: 1.7-4.3), age range  $\geq 40$  years and between 30 and 39 years (OR=3.0; CI: 1.5-5.9 and OR =2.4; CI: 1.3-4.3, respectively), night work (OR=2.8; CI: 1.6-5.0), civil servants (OR=2.7; CI: 1.4-5.0), obesity and overweight (OR=4.3; CI: 2.1-8.6 and

**Table 1.** Classification of blood pressure in health workers working in high-complexity services for critically-ill and chronic patients, according to the 7th Brazilian Guidelines of Cardiology. Northern Minas Gerais Macro Region, Brazil, 2017/2018 (n=490).

Blood Pressure Classification	n*	%
Normal	247	52.9
Prehypertension	118	25.3
Stage I hypertension	79	16.9
Stage II hypertension	17	3.6
Stage III hypertension	06	1.3

\*Variation in n=490 due to loss of information.

Source: Elaborated by the authors.



**Figure 1.** Theoretical hierarchical model for arterial hypertension in professionals working in high-complexity services for critically-ill and chronic patients.

Source: Elaborated by the authors.

**Table 2.** Multinomial hierarchical multiple analysis of factors associated with AH in health workers working in high-complexity services for critically-ill and chronic patients. Northern Minas Gerais Macro Region, Brazil, 2017/2018 (n=490, which may vary between variables).

Variables	Prehypertension		Hypertension	
	OR (95%CI)	p-value	OR (95%CI)	p-value
<b>Distal Level</b>				
Gender				
Male	2.7 (1.7-4.3)	<0.001	3.1 (1.9-5.1)	<0.001
Female	1.0		1.0	
Age range				
≥40 years	3.0 (1.5-5.9)	0.002	2.6 (1.3-5.0)	0.005
30 to 39 years	2.4 (1.3-4.3)	0.006	1.2 (0.6-2.1)	0.659
20 to 29 years	1.0		1.0	
<b>Intermediate Level</b>				
Sleep				
Impaired	0.9 (0.6-1.5)	0.712	0.5 (0.3-0.9)	0.023
Preserved	1.0		1.0	
Work shift				
Day/Night	0.9 (0.5-1.9)	0.878	0.8 (0.4-1.6)	0.526
Night	2.8 (1.6-5.0)	<0.001	1.3 (0.7-2.4)	0.501
Day	1.0		1.0	
Employment relationship				
Civil servant	2.7 (1.4-5.0)	0.003	2.3 (1.1-4.7)	0.020
Hired/CLT	1.0		1.0	
Use of continuous medication				
Yes	0.6 (0.3-1.3)	0.198	2.7 (1.5-5.0)	0.001
No	1.0		1.0	
<b>Proximal Level</b>				
BMI				
Obesity	4.3 (2.1-8.6)	<0.001	8.3 (3.8-18.1)	<0.001
Overweight	1.9 (1.1-3.3)	0.032	3.1 (1.6-6.1)	0.001
Normal weight/underweight	1.0		1.0	

OR: odds ratio; CI: Confidence Interval; CLT: Brazilian Consolidation of Labor Laws.

Source: Elaborated by the authors.

OR=1.9; CI: 1.1-3.3 respectively) were associated to prehypertension.

## Discussion

The prevalence of AH in the studied group was similar to that found in a study carried out with health workers from Spain, of 22.9%<sup>27</sup>. Higher results were found in a survey carried out with cardiologists in China<sup>6</sup>, with a prevalence of 63.9%, and in a general hospital in Ghana<sup>7</sup> with 52.6%. However, lower prevalence rates, of 11.1%, 14%, 16.7% and 19%, were observed in Thailand<sup>28</sup>, Malaysia<sup>29</sup>, Iran<sup>30</sup> and Mexico<sup>31</sup>, respectively.

In the national scenario, a study<sup>9</sup> carried out in an Oncology Hospital in the city of Rio de Janeiro was identified, showing a similar design to that of the present study, whose estimated prevalence was 25.5%. However, the need for more studies to assess the prevalence of AH in this specific group of workers is highlighted, as most studies were conducted by professionals working in hospital services with general practice care, which limited the comparison of data. Also in the national context, the prevalence of the disease among health workers varied between 20.6%<sup>8</sup>, 28.9%<sup>10</sup> and 12.7%<sup>11</sup>.

The prevalence of prehypertension in the present investigation was lower than that found

in a Ghanaian study, whose result was 52.6%<sup>7</sup>. Moreover, a longitudinal study<sup>32</sup> demonstrated that prehypertension increases the risk of incident hypertension, with annual rates ranging from 8% to 20%. A prospective cohort conducted by Jardim et al.<sup>33</sup>, in Brazil, observed a similar result, with an increase in the prevalence of hypertension from 4.6% to 18.6% after 20 years of follow-up. Pre-hypertensive individuals are more likely to become hypertensive and have a higher risk of developing cardiovascular complications, when compared to individuals with normal BP, requiring periodic follow-up<sup>1</sup>.

The male population in this study had a greater chance of developing pre-hypertension and AH when compared to the female population. Studies carried out in China<sup>6</sup> and Iran<sup>30</sup> showed a significant association between male gender and hypertension. Moreover, men are more affected by this disease up to 50 years of age. On the other hand, as women produce female hormones, which are protective factors, they tend to have a low incidence before menopause, with the risk increasing from the sixth decade of life onwards<sup>34</sup>. Moreover, there is a stronger association between male gender and other factors associated with AH, such as smoking, alcohol consumption, obesity and sedentary lifestyle<sup>35</sup>.

In an investigation that aimed to characterize the metabolic and cardiovascular risk profile in an asymptomatic Brazilian adult population, it was observed that prehypertension was significantly more frequent in males and in those with a sedentary lifestyle and/or overweight. These results were also found in a population-based investigation carried out in the city of Florianópolis, state of Santa Catarina, Brazil<sup>36</sup>.

Regarding the age range, international studies<sup>6,37</sup> indicate that the older the age, the greater the chance of developing AH, which corroborates the results of the present study, since professionals over 30 years old were more likely to develop prehypertension, and those over 40 years of age, to develop AH, when compared to the group of professionals aged between 20 and 29 years. There is a direct and linear association between aging and the prevalence of AH, justified by aging and vascular stiffening<sup>1</sup>.

Professionals who worked the night shift were more likely to develop prehypertension when compared to day shift workers. A cohort study carried out with American nurses<sup>38</sup> showed that professionals who slept less than five hours a day were 1,19-fold [1.14-1.25] more likely to develop high blood pressure values, when com-

pared to those who slept more than seven hours a day. It is known that a short sleep duration, common among night workers, is a significant etiological factor for the increase in BP and the development of AH. An investigation conducted with nurses in Italy<sup>39</sup> showed that, in this group of professionals, there is a greater consumption of coffee, cigarettes, alcohol, hypnotic drugs and a sedentary lifestyle. Moreover, sleep deprivation prolongs exposure to stress, increases appetite, favors obesity and increases serum total cholesterol levels, factors that are highly associated with the development of AH<sup>38</sup>.

Professionals who were civil servants had a greater chance of developing prehypertension and AH, similar to the investigation carried out in the national context by Cunha et al.<sup>40</sup>, who showed a prevalence of 21% among civil servants and 15.5% in other workers. Civil servants have better labor and economic stability and a set of labor rights that are different from those of the other workers; however, during the data collection period, the assessed Brazilian state was going through a financial crisis that resulted in delayed payment to civil servants<sup>41</sup>. These delays may have reflected on the physical and emotional health of these professionals, as well as arbitrated changes in lifestyle, with a direct impact on diet, physical activity, leisure and, consequently, on prehypertension and AH status.

Furthermore, workers who used continuous medications were more likely to develop AH. Similar results were found in national surveys<sup>8,11</sup> which showed that more than half of the professionals used continuous medication, with oral contraceptives being the most prevalent class. A study shows that women who use this medication have two-to-three fold greater chances of having AH than those who do not use this contraceptive method, as this drug causes a small increase in cardiac output<sup>42</sup>.

Overweight and obesity are strong factors associated with AH. In this study, obese professionals were 8.3-fold more likely to develop AH when compared to professionals with normal weight. Lower results were found in international studies in China with OR=1.31<sup>6</sup> and in Mexico with OR=3.6<sup>31</sup>. Overweight and obesity can be explained by the irregular practice of physical activity and inadequate diet, being related to diabetes, cardiovascular disease and cancer. In the work environment, they are supposedly associated with occupational injuries, increased absenteeism rates, discrimination, presenteeism and reduced productivity<sup>10</sup>.

The results of this study should be considered, as they are representative of the population of workers working in high-complexity services that care for critically-ill and chronic patients in the North of Minas Gerais, Brazil. It is expected that the dissemination of the obtained information will be considered by the managers who work with this group of professionals. Furthermore, it is appropriate to emphasize the need to expand research in the scientific community aimed at discussing the prevalence of prehypertension and AH and their associated factors among these professionals. This investigation also highlights the importance of working directly with the workers with a higher chance of developing prehypertension in a preventive manner, encouraging changes in habits and the adoption of a healthy lifestyle.

The prevalence of AH in the assessed group was lower than that found in the Brazilian population. Although the population assessed in this study has received formal education in health-related areas, the results reinforce the importance of investing in preventive measures, carried out by hospital managers, aimed at encouraging changes to a healthy lifestyle, such as adequate nutrition and regular physical activity among these professionals. It is also important to promote respect for the rest periods and adequate conditions for the professionals' rest, as such measures contribute not only to improving the overall well-being, but also to weight and anxiety control, reduction of depressive states and disease prevention. This occurs because, by taking care of diet and physical activity in the workplace, they open up the possibility of improving the workers' health, contributing to a positive and social image of the company, increasing the teams' self-esteem, reducing staff turnover and work absenteeism, increasing productivity and reducing medical leave and the costs of medical care and disability among these professionals.

Some limitations of this study need to be considered. The use of a self-administered ques-

tionnaire is susceptible to misinterpretation and mistakes when filling it out, and it is also possible that the professionals have underreported behaviors considered to be negative to health, as the research took place in the hospital environment. Moreover, the small number of investigations carried out with professionals working in hospital services that deal with critically-ill and chronic patients made it difficult to compare the findings. However, the methodological rigor used in the investigation is highlighted, such as sample planning, the use of validated instruments, the training and calibration of examiners, adequate data collection techniques and entering data in duplicate. These points maintained the quality control of the instruments and ensured study validity and reliability regarding the presented analysis and strategies.

## Conclusion

The prevalence of prehypertension and AH among health professionals demonstrates the need to adopt mechanisms that act on modifiable risk factors, such as encouraging physical activity, adopting healthier eating habits, as well as promoting the implementation of health policies that encourage changes inside and outside the work environment, with greater focus on workers' health prevention and promotion. Therefore, it is necessary to engage professionals and managers of health services, in a joint and complementary manner, aiming to facilitate better health situations.

Well-informed workers who are aware that their behavior can determine the greater or lesser risk of becoming ill are certainly healthier and more productive. It is also important to emphasize the effort that must be applied to adapt the workplace to the needs of individuals, aiming to reduce public expenses arising from pathological processes directly related to labor dysfunctions.



## Collaborations

SGS Pereira, RF Silva Junior, CDAL Ribeiro, HA Barbosa, JDRV Torres and CSO Silva participated in the study design, review, data analysis and writing of the final version of the manuscript.

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