

ORIGINAL ARTICLE

# Abdominal obesity is associated with stress levels among public safety personnel

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## Abstract

**Introduction:** the modern lifestyle, characterized by intense routines and inadequate diets, contributes to the increase in non-communicable diseases (NCDs), especially obesity, which can be influenced by stress. The relationship between stress, nutritional status, and NCDs lacks comprehensive studies, especially concerning public security professionals.

**Objective:** to evaluate abdominal obesity and its association with stress symptoms in public safety personnel in a metropolitan region of a Brazilian capital.

**Methods:** the study is part of the “SOMA-SI” program, which investigated the health of public security agents in Espírito Santo between April and December 2022. The sample included police officers, firefighters, and municipal guards (n=216). Healthy adults, who were public safety personnel, were included, while those on leave or under psychiatric treatment were excluded. Blood pressure measurements, anthropometric assessments, and the Lipp’s Inventory of Stress Symptoms for adults were among the variables measured. The Statistical Package for Social Science (SPSS) v. 25 for Windows® was used for statistical analyses. Chi-square and Mann-Whitney tests were performed at a significance level of 5%, exploring associations between categorical variables and differences in median stress scores.

**Results:** the sample consisted of 216 participants, predominantly men (75.5%) and non-white (63.7%), revealing that 61.6% had more than 15 years of work experience, 81.1% had income above six minimum wages, and 77.3% had completed higher education. Military police officers represented the majority (67.6%), with 72.2% being parents, 57.9% alcohol consumers, and 9.3% smokers. Most participants had excess body fat (70.8%) and weight (77.3%). Statistical associations were observed between waist circumference and stress symptoms ( $p = 0.004$ ).

**Conclusion:** the study uncovered a prevalent occurrence of abdominal adiposity and stress among public safety personnel. Furthermore, it elucidates a significant prevalence of excess weight within the sample, coupled with a pronounced incidence of stress symptoms. These findings underscore a complex and mutually influential relationship between these variables. However, they also emphasize the critical need for more extensive research efforts to understand the impact of stress on individuals working in public safety roles.

**Keywords:** obesity, psychological stress, public safety personnel, nutrition sciences, public health.

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## Authors summary

### Why was this study done?

This study aimed to establish a connection between abdominal obesity and stress among public safety personnel. With 216 participants, we identified associations between these factors, emphasizing the importance of integrated approaches to the mental and physical health of these security professionals.

### What did the researchers do and find?

The researchers conducted a study involving 216 public safety personnel, examining the relationship between abdominal obesity and stress. They conducted measurements, including blood pressure checks and anthropometric assessments, and administered the Lipp's Inventory of Stress Symptoms for adults. Through statistical analysis using SPSS v.25, they identified a potential association between abdominal obesity and heightened stress symptoms among these professionals.

### What do these findings mean?

These findings suggest a link between abdominal obesity and a potential increase in stress symptoms among public safety personnel. This underscores the importance of addressing both physical and mental health in professions characterized by high stress. Implementing holistic strategies to manage stress and promote healthier lifestyles may significantly benefit the well-being of these individuals, potentially reducing the risk of chronic disease.

### Highlights

There is a higher frequency of stress symptoms and excess weight among public security professionals.

Public security professionals with abdominal obesity expressed a higher frequency of stress symptoms.

It was observed that public security professionals with higher fasting blood glucose levels exhibited higher frequencies of stress symptoms.

## INTRODUCTION

Contemporary global dynamics reflect profound transformations in demographic, nutritional, urban, and socioeconomic patterns. This complex interconnection is redefining the contours of lifestyle in many societies, triggering multifaceted transitions. The interaction between demographic and nutritional transitions, along with the urbanization process and socioeconomic growth, is promoting a way of life marked by a vigorous routine<sup>1</sup>. This pattern is often identified by the predominant consumption of processed foods, whose nutritional value is reduced while the caloric content remains high. This scenario has played a significant role in increasing the prevalence of Chronic noncommunicable diseases (NCDs), notably obesity<sup>2</sup>.

By exploring the interconnections of these factors, the impact of this sociodemographic evolution on public health becomes evident<sup>3</sup>. Simultaneously, sociocultural transformations have increased stress levels in the general population<sup>4,5</sup>, generating significant impacts on health systems around the world.

Stress, as outlined by Selye's three-phase model<sup>6</sup>, presents a relevant dimension to this discussion. The body's reaction to the intensification of routine and modern challenges manifests itself in distinct phases, from the alert phase, with the release of adrenaline and noradrenaline, to the resistance phase, characterized by the body's adaptation through the release of cortisol. However, the exhaustion phase highlights the organism's vulnerability, suggesting a potential link between contemporary sociodemographic challenges and susceptibility to psychosocial stress. Understanding these interconnections amplifies the perception of the multiple impacts on health, opening space for more comprehensive preventive strategies.

This definition is defended by Lipp<sup>7</sup> as a state of tension that interrupts the normal functioning of the body in response to stressful events, such as changes in employment, violence, family losses, financial instability, and illnesses<sup>6,8,9</sup>. It utilizes the model defined by Selye<sup>6</sup> in

the instrument for evaluating these symptoms in adults<sup>10</sup>.

In this context, public security professionals, due to the challenging nature of the activities they perform, constantly face risks and dangerous situations<sup>11</sup>. Studies in Brazil have revealed elevated levels of stress in this group, with a prevalence of around 40%<sup>12,13</sup>, showing a direct relationship between police activity and chronic stress<sup>14,15</sup>.

The negative influence of stress on the role performed by public security agents, whether due to absences for psychiatric treatments or reduced productivity, not only impacts the costs of the health system but also compromises the effectiveness of public security operations<sup>16,17</sup>.

Excessive exposure to stress, with individuals mainly in the exhaustion phase, can lead to metabolic problems, such as hyperglycemia, insulin resistance, dyslipidemia<sup>18</sup>, and be associated with the accumulation of fat in the central region of the abdomen due to changes in hormonal regulation, which occur due to excessive exposure to stress, such as sensitivity to ghrelin or even a reduction in its production, due to impairment of the hypothalamic-pituitary-adrenal (HPA) axis<sup>19</sup>.

In addition, excess cortisol can negatively affect the beta cells of the pancreas, increasing the production of glucose in the liver and body, contributing to insulin resistance, and may even lead to the development of type 2 diabetes, in addition to other metabolic problems<sup>20</sup>. In this sense, there is a prominent need for studies that address the relationship between stress, nutritional status, and the respective consequences in public security professionals, especially in the context of the state of Espírito Santo, aiming to support preventive strategies and interventions aimed at promoting the health of these professionals and optimizing performance in public security activities.

The scarcity of studies that address the nutritional status of these professionals, considered a risk factor for the development of NCDs<sup>21</sup>, represents a gap in the scientific literature. The association of obesity with several other NCDs, which are responsible for a large number of deaths

worldwide, regardless of socioeconomic level<sup>22</sup>, reinforces the urgency of investigations that address this relationship. Therefore, the specific characterization of stress among public security professionals, especially in the state of Espírito Santo, still requires in-depth analysis.

Therefore, the objective was to evaluate abdominal obesity and its association with stress symptoms in public security professionals in the metropolitan region of a Brazilian capital.

## METHODS

### Study design, location, and period

This is a cross-sectional study that is part of the larger study entitled “SOMA-SI - A Well-Being Self-Management Program based on Stress Analysis of Public Security Agents in Espírito Santo”. Data were collected from April to December 2022.

### Sample and eligibility criteria

The sample was made up of public security agents from the metropolitan area of Vitória, Espírito Santo, including the Federal Police, Federal Highway Police, Military Police, Military Fire Brigade, Municipal Guard of Vitória, Serra, Viana and Vila Velha.

The sample size was calculated considering the sample of public security personnel in the State of Espírito Santo, whose population in 2021 corresponded to 3,723 individuals, 2,547 Military Police, 649 Military Firefighters, 247 Federal Police and 280 Municipal Guards. The sample size was calculated by setting  $\alpha$  at 5% (type I error) and considering a statistical power of 80% ( $\beta=0.20$ ). In the calculation was taken into account the prevalence of obesity in the state, 17.9%, evidenced in the last Vigitel - a telephone survey carried out annually by the Brazilian Ministry of Health<sup>23</sup>, in which the sample of this research was equal to 216 public security agents.

Inclusion criteria were: adults > 18 years of age of both sexes; public security agents and residents of the State of Espírito Santo; police officers belonging to the security forces at the State, Federal and Municipal levels, active in their role. The following were excluded from this study: public security officers who were temporarily or permanently absent from police activities during the study; diagnosed with a mood or psychiatric disorder or undergoing psychiatric treatment.

### Data collection

#### Blood pressure

Blood pressure was measured according to the method validated by Mill<sup>24</sup> in the ELSA Brazil study, with the subjects resting for 5-10 minutes, in a sitting position with the feet supported on the floor and, after emptying the bladder, with a cuff suitable for the circumference of the arm. The first recorded measurement was discarded, and after two more measurements, 1 minute apart, if the difference was greater than 5 mmHg, a third measurement was taken and the arithmetic mean of the last two measurements was calculated<sup>24</sup>.

### Anthropometric assessment

The anthropometric assessment was performed

by nutritionists in the morning, respecting the minimum fasting period of 8 hours. Participants were instructed to fast for at least 8 hours, not to consume caffeine or exercise in the 24 hours prior to the examination, and to remove metal objects such as earrings, rings, and glasses.

Height was assessed using a stadiometer with a maximum capacity of 2.10 m and an accuracy of 0.5 cm. Waist circumference was measured using an inelastic tape measure with an accuracy of 0.1 cm and a maximum length of 2 m. It was classified according to the reference<sup>25</sup> performed at the midpoint between the last rib and the iliac crest<sup>26,27</sup>. Hip circumference was measured at the point of greatest volume in the trochanteric region<sup>26</sup>. Body mass index (BMI) was calculated and classified according to the WHO reference for adults<sup>25</sup>, with underweight individuals presenting BMI values of 18.5 kg/m<sup>2</sup>, eutrophic: 18.5 to 24.9 kg/m<sup>2</sup>, overweight: 25.0 to 29.9 kg/m<sup>2</sup>, and obese: BMI  $\geq$  30 kg/m<sup>2</sup>, which is later categorized into two variables, BMI: not overweight: 18.5 kg/m<sup>2</sup> to 24.9 kg/m<sup>2</sup>, overweight: >25 kg/m<sup>2</sup>.

### Stress Symptom Inventory

The Lipp's Inventory of Stress Symptoms for adults (LSSI) is an instrument validated in the Brazilian adolescent and adult population with a Cronbach's alpha of 0.91<sup>10</sup>.

This inventory was standardized and validated by Lipp and Guevara<sup>7</sup> and is based on a three-phase model developed by Selye<sup>6</sup>. The phases of stress included in the LSSI are alert, resistance, and exhaustion. The inventory also contains a total of 53 closed-ended questions, divided into three dimensions that deal with physical (34 items) and psychological (19 items) symptoms.

### Data analysis

The data were tabulated in a Microsoft Excel spreadsheet and subjected to a prior consistency analysis. In order to characterize the sample in terms of socio-demographic, health and lifestyle profile, it was decided to present the categorized variables, with the results expressed in relative and absolute frequencies. For data analysis, the chi-square test was used, with categorical variables, those that were continuous were categorized as dichotomous, and then the chi-square test was used at 5% significance. To compare the difference in the medians of the waist circumference factor scores between groups of individuals without symptoms or with symptoms of stress, the Mann-Whitney test was chosen at 5% significance. The Statistical Package for Social Science version 25.0 for Windows<sup>®</sup> (SPSS) was used for all statistical analyses, with alpha set at 5%. The option of not including missing data in the tests was used.

### Ethical and legal aspects of research

The study was approved by the Research Ethics Committee of the Health Sciences Center at the Federal University of Espírito Santo (CEP-CCS-UFES), according to the Certificate of Ethical Appreciation no. 53145521.1.0000.50.60, in compliance with Resolution 466/2012 of the Brazilian National Health Council and approval no. 5.163.467.

**RESULTS**

The total sample consisted of 216 participants, of whom 75.5% were male and 24.5% were female, with the majority identifying as non-white (63.7%). Most individuals reported working for 15 years or more (61.6%), earning less than five minimum wages (81.1%), and having

a college education (77.3%). The largest percentages of the sample worked in the military police (67.6%), had children (72.2%), consumed alcoholic beverages (57.9%), did not currently smoke (9.3%), were in the normal waist circumference risk class (56.9%), and were overweight by BMI (77.3%) (table 1).

**Table 1:** Sociodemographic characteristics and anthropometric measurements of public security agents in Grande Vitória

Characteristics	Total n (%)	Female n(%)	Male n(%)	p-value
<b>Race/color</b>				
White	78(36.11)	19 (24.4%)	59 (75.6%)	0.940
Non-white	137(63.43)	34 (23.8%)	103 (75.2%)	
No information	1(0.46)			
<b>Working time (years)</b>				
≥ 15	133(61.6)	31 (23.3%)	102 (76.7%)	0.595
0 - 15	83(38.4)	22 (26.5%)	61 (73.5%)	
<b>Income (minimum wages)</b>				
≤ 5	150(69.44)	35 (23.3%)	115 (76.7%)	0.318
≥6	35(16.20)	11 (31.4%)	24 (68.6%)	
No information	31(14.35)			
<b>Education</b>				
Secondary or technical	49(22.7)	8 (16.3%)	41 (83.7%)	0.129
Bachelor's degree	167(77.3)	45 (26.9%)	122 (73.1%)	
<b>Field of operation</b>				
Military police	146(67.6)	31 (21.2%)	115 (78.8%)	0.059 <sup>a</sup>
Municipal guard	23(10.6)	7 (30.4%)	16 (69.6%)	
Federal police	19(8.8)	9 (47.4%)	10 (52.6%)	
Fire department	21(9.7)	3 (14.3%)	18 (85.7%)	
State Secretariat for Public Security (SESP)	7(3.2)	3 (42.9%)	4 (57.1%)	
<b>Drinking habit</b>				
Does not currently drink	91(42.1)	24 (26.4%)	67 (73.6%)	0.593
Currently drinks	125(57.9)	29 (23.2%)	96 (76.8%)	
No information	1(0.46)			
<b>Tobacco</b>				
Do not smoke	195(90.28)	50 (25.6%)	145 (74.4%)	0.293 <sup>a</sup>
Currently smokes	20(9.26)	3 (15.0%)	17 (85.0%)	
No information	1(0.46)			
<b>Waist circumference</b>				
Normal risk	123(56.9)	31 (25.2%)	92 (74.8%)	0.794
Increased risk	93(43.1)	22 (23.7%)	71 (76.3%)	
<b>BMI</b>				
Normal	49(22.7)	13 (26.5%)	36 (73.5%)	0.712
Overweight	167(77.3)	40 (24.0%)	127 (76.0%)	
<b>Stress phase</b>				
None	77(35.6)	15 (19.5%)	62 (80.5%)	0.279 <sup>a,b</sup>
Alert	1(0.5)	0 (0.0%)	1 (100.0%)	
Resistance	92(42.6)	22 (23.9%)	70 (76.1%)	
Near exhaustion	16(7.4)	7 (43.8%)	9 (56.3%)	

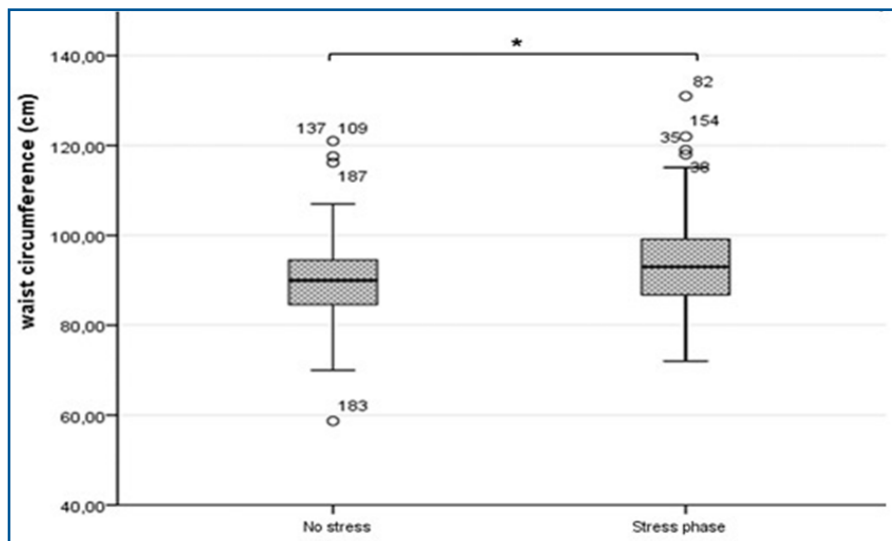
**Continuation - Table 1:** Sociodemographic characteristics and anthropometric measurements of public security agents in Grande Vitória

Characteristics	Total n (%)	Female n(%)	Male n(%)	p-value
Exhaustion	30(13.9)	9 (30.0%)	21 (70.0%)	
Blood pressure				
Normal	124(57.41)	42 (33.9%)	82 (66.1%)	<b>&lt;0.001</b>
Altered	91(42.13)	11 (12.1%)	80 (87.9%)	
No information	1(0.46)			
Fasting blood glucose				
Desirable	158 (73.15)	44 (27.8%)	114 (72.2%)	<b>0.036*</b>
Altered	52 (24.07)	7 (13.5%)	45 (86.5%)	
No information	6(2.78)			
Cholesterol				
Desirable	107 (49.54)	32 (29.9%)	75 (70.1%)	0.610
Altered	106 (49.07)	20 (18.9%)	86 (81.1%)	
No information	3(1.39)			
Triglycerides				
Desirable	158(73.15)	39 (24.7%)	119 (75.3%)	0.876
Altered	55(25.46)	13 (23.6%)	42 (76.4%)	
No information	3(1.39)			
HDL				
Desirable	211(99.1)	51 (24.2%)	160 (75.8%)	0.397 <sup>a,b</sup>
Altered	2 (0.93)	1 (50.0%)	1 (50.0%)	
No information	3(1.39)			
LDL				
Desirable	104 (48.15)	32 (30.8%)	72 (69.2%)	0.500
Altered	105 (48.61)	20 (19.0%)	85 (81.0%)	
No information	7(3.24)			

Note: BMI: Body mass index, Bonferroni correction  $5 \times 2 = 10 = 0.05/10 = 0.005$ . No information: individuals who selected the “do not respond option.”

Table 2 presents the results of the association analysis between nutritional status and the classifications obtained in the LSSI. It is noted that statistically significant values were identified for stress symptoms ( $p = 0.004$ ).

Figure 1 shows the result of the Mann-Whitney analysis of the relationship between abdominal adiposity and stress at any stage of the Lipp’s Inventory of Stress Symptoms.



**Figure 1:** Relationship between abdominal adiposity and stress across LSSI Phases \*p-value= 0.0035

**Table 2:** Chi-square test of association between abdominal obesity, sociodemographic variables, and stress phase classification according to the Lipp's Inventory of Stress Symptoms

Characteristics	Total n(%)	Waist Percentage		p-value
		Normal Risk n(%)	Increased Risk n(%)	
<b>Sex</b>				
Female	53(24.5)	31(58.5)	22(41.5)	0.794
Male	163(75.5)	42(53.8)	36(46.2)	
<b>Race</b>				
White	78(36.3)	42(53.8)	36(46.2)	0.518
Non-white	137(63.7)	80(58.4)	57(41.6)	
No information	1(0.46)			
<b>Working time (years)</b>				
≥ 15	133(61.6)	76(57.1)	57(42.9)	0.941
0 - 15	83(38.4)	47(56.6)	36(43.4)	
<b>Income (minimum wages)</b>				
≤ 5	150(81.1)	81(54.0)	69(46.0)	0.520
≥6	35(19.9)	21(60.0)	14(40.0)	
No information	31(14.35)			
<b>Education</b>				
Secondary or technical	49(22.7)	32(65.3)	17(34.7)	0.179
Bachelor's degree	167(77.3)	91(54.5)	76(45.5)	
<b>Field of operation</b>				
Military police	146(67.6)	81(55.5)	65(44.5)	0.373 <sup>a</sup>
Municipal guard	23(10.6)	15(65.2)	8(34.8)	
Federal police	19(8.8)	14(73.7)	5(26.3)	
Fire department	21(9.7)	10(47.6)	11(52.4)	
State Secretariat for Public Security (SESP)	7(3.2)	3(42.9)	4(57.1)	
<b>Drinking habit</b>				
Does not currently drink	91(42.1)	49(53.8)	42(46.2)	0.616
Currently drinks	125(57.9)	74(59.2)	51(40.8)	
<b>Tobacco</b>				
Does not smoke	195(90.28)	112(57.4)	83(42.6)	0.834
Currently smokes	20(9.26)	11(55.0)	9(45.0)	
No information	1(0.46)			
<b>BMI</b>				
Normal	49(22.7)	47(95.9)	2(4.1)	>0.001*
Overweight	167(77.3)	76(45.5)	91(54.5)	
<b>Stress phase</b>				
None	77(35.6)	54(70.1)	23(29.9)	0.016 <sup>a,*,c</sup>
Alert	1(0.5)	0(0)	1(100)	
Resistance	92(42.6)	49(53.1)	43(46.7)	
Near exhaustion	16(7.4)	5(31.3)	11(68.8)	
Exhaustion	30(13.9)	15(50)	15(50)	
<b>Stress</b>				
None	77(35.5)	54(70.1)	23(29.9)	0.004*
At some stage	139(64.5)	69(49.6)	70(50.4)	

**Continuation - Table 2:** Chi-square test of association between abdominal obesity, sociodemographic variables, and stress phase classification according to the Lipp's Inventory of Stress Symptoms

Characteristics	Total n(%)	Waist Percentage		p-value
		Normal Risk n(%)	Increased Risk n(%)	
Blood pressure				
Normal	124(57.41)	76(61.3)	48(38.7)	0.158
Altered	91(42.13)	47(51.6)	44(48.4)	
No information	1(0.46)			
Fasting blood glucose				
Desirable	158 (73.15)	91(57.6)	67(42.4)	0.818
Altered	52 (24.07)	29(55.8)	23(44.2)	
No information	6(2.78)			
Cholesterol				
Desirable	107 (49.54)	56(52.3)	51(47.7)	0.143
Altered	106 (49.07)	66(62.3)	40(37.7)	
No information	3(1.39)			
Triglycerides				
Desirable	158(73.15)	92(58.2)	66(41.8)	0.634
Altered	55(25.46)	30(54.5)	25(45.5)	
No information	3(1.39)			
HDL				
Desirable	211(99.1)	120(56.9)	91(43.1)	,220 <sup>a,c</sup>
Altered	2 (0.93)			
No information	3(1.39)	2(100.0)	0(0,0)	
LDL				
Desirable	104 (48.15)	55(52.9)	49(47.1)	0.239
Altered	105 (48.61)	64(61.0)	41(39.0)	
No information	7(3.24)			

Note: BMI: Body Mass Index. HDL: High Density Lipoprotein. LDL: Low Density Lipoprotein It is. No information: individuals who selected the "do not respond option."

## DISCUSSION

The present study aimed to analyze the relationship between abdominal adiposity and stress symptoms in public safety professionals, following the criteria established by Lipp. A detailed analysis of the sample with respect to gender revealed significant associations with age group, length of service, type of service (internal/external), income, body mass index, and presence of children. However, there was no direct relationship between these variables and stress symptoms or anthropometric measures. However, a statistically significant correlation was found between abdominal circumference and stress in the sample.

In this context, it is important to emphasize that prolonged exposure to stress may be associated with the accumulation of fat in the central region of the abdomen, as found in this study. This result may be related to changes in hormonal regulation, affecting sensitivity to ghrelin and, in some cases, leading to a reduction in its production due to impairment of the hypothalamic-pituitary-adrenal (HPA) axis<sup>19</sup>. The association between prolonged stress and abdominal obesity has also been shown in other studies<sup>28,29</sup>.

Therefore, this relationship is bidirectional, as stress can influence abdominal obesity and vice versa, creating a cycle that is potentially harmful to health<sup>30</sup>. This condition can lead to metabolic problems such as hyperglycemia, insulin resistance, and dyslipidemia<sup>18</sup>.

It is noteworthy that prolonged exposure to stress, and consequently cortisol, increases blood glucose levels and stimulates the maturation of adipocyte precursors, promoting excess body fat<sup>31</sup>. This increase in cortisol stimulates the brain's mesolimbic reward pathways, resulting in increased intake of palatable, sugary foods<sup>32</sup>. A study of 3,000 participants found that individuals who were regularly exposed to stressful situations were more likely to develop obesity and type 2 diabetes than those with low exposure to stress<sup>33</sup>, supporting the findings of this study.

Although the present study did not find an association between fasting blood glucose levels and stress, it highlights the complex relationship between mental and physical health found in other studies in which blood glucose presented association with psychological stress<sup>9,32,34</sup>. However, the measurement of fasting blood

glucose in public safety professionals may not be sensitive when we encounter individuals who are highly stressed and they took night shifts<sup>35</sup>.

The HPA is a major regulator of the hormones glucocorticoids, which play a fundamental role in glucose control during periods of acute stress<sup>36,37</sup>. Cortisol, the end product of the HPA, stimulates glucose production and glycogen depletion, in addition to reducing the uptake of glucose by peripheral tissues, thereby increasing its concentration in the bloodstream and leading to hyperglycemia<sup>38</sup>. Sustained activation of the HPA axis by stressful stimuli results in increased release of glucocorticoids, the major hormonal response to stress, which can disrupt normal glucose regulation<sup>39</sup>. Furthermore, constant activation of this axis has been found even in patients with type 2 diabetes<sup>40</sup>.

In conclusion, although this study did not find an association between stress and fasting glucose, the interaction between these factors is multifaceted and complex. Future studies that include additional variables and take into account the heterogeneity of the stress response and more robust analyses should be considered.

Another mechanism reported in research is that chronic stress can affect appetite-regulating hormones such as ghrelin and leptin. This influence can lead to a reduction in the feeling of satiety, causing changes in eating behavior, leading to the consumption of more palatable foods and contributing to the accumulation of abdominal fat<sup>19,41</sup>.

It is important to highlight the predominance of males among public safety personnel, which reflects a pattern observed in other studies of this population<sup>28,42</sup>. Having a relationship with blood glucose and blood pressure, in line with the literature that points out differences in the search for health services between men and women, indicating that men tend to seek health services less<sup>43-45</sup>, and when they do, they usually present the most advanced or critical state of the disease<sup>28</sup>.

However, there was a preponderance of overweight in the sample, which exceeded the population averages of the state, according to data from the last *Vigitec*<sup>23</sup>. This finding is consistent with recurring findings in research on security officers<sup>42,46,47</sup>. This is consistent with a high incidence of stress symptoms in the sample (63.4%), with a significant value in the exhaustion phase (13.9%), which exceeds values observed in other locations and may indicate a complex relationship between stress and obesity<sup>42,47</sup>.

Although the present study has a cross-sectional design, this does not allow precise causal relationships to be established. However, these findings and discussions are crucial for understanding the factors that contribute

to the health of these professionals, as they can support intervention strategies and policies aimed at promoting the mental and physical health of this population.

Furthermore, there is a lack of studies on this topic, especially in Brazil, and the factors that may explain this gap are: the reluctance of some institutions and police officers to engage in interventions or research on mental health, the fear of police officers regarding the confidentiality of the data reported, the fear of demonstrating weakness in front of professional colleagues and the institution<sup>48,49</sup>. This also had an impact on this study as a limitation in which, among some variables, the option “I prefer not to answer” was highlighted by police officers.

It is also recommended that additional methods be used to more accurately assess the degree of influence that stress and abdominal obesity have on public safety officers.

## CONCLUSION

The study revealed a higher frequency of abdominal obesity in public safety officers with higher levels of stress symptoms, in addition to demonstrating frequency high incidence of overweight in the sample, a high incidence of stress symptoms, indicating a complex and bidirectional relationship between both variables. In addition to confirming previous findings about the association between prolonged stress and abdominal obesity, the research identified correlations between blood glucose, blood pressure and demographic characteristics, such as sex and age.

## Author contributions

All authors contributed to the manuscript. Literature search: LCBSN, TVDS, LCLJ, MLMS; Data collection: LCBSN, TVDS, LCLJ, MLMS, EBB, PLF; Study design: LCBSN, CHPC, TVDS, LCLJ, MLMS; Analysis of data: LCBSN, TVDS, CHPC, LCLJ, MLMS, EBB, PLF; Manuscript preparation: LCBSN, TVDS, LCLJ, MLMS, CHPC, EBB, PLF, AMAS; Review of manuscript: LCBSN, TVDS, LCLJ, MLMS, EBB, PLF, AMAS.

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## Conflicts of interest

The authors declare that there is no conflict of interest.

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## Resumo

**Introdução:** o estilo de vida moderno, marcado pela rotina intensa e alimentação inadequada, contribui para o aumento das Doenças Crônicas Não Transmissíveis, especialmente a obesidade, que pode ser influenciada pelo estresse. A relação entre estresse, estado nutricional e Doenças Crônicas Não Transmissíveis carece de estudos abrangentes no Brasil e no mundo, principalmente quando se refere aos profissionais de segurança pública.

**Objetivo:** avaliar a obesidade abdominal e sua associação com sintomas de estresse em profissionais de segurança pública na região metropolitana de uma capital do Brasil.

**Método:** o estudo faz parte do programa “SOMA-SI”, que investigou a saúde de agentes de segurança pública do Espírito Santo entre abril e dezembro de 2022. A amostra incluiu policiais, bombeiros e guardas municipais (n=216). Foram incluídos profissionais de segurança pública, adultos saudáveis e excluiu-se os servidores afastados ou sob tratamento psiquiátrico. Dentre as variáveis mensuradas incluiu-se as medidas de pressão arterial, avaliação antropométrica e Inventário de Sintomas de Estresse de Lipp. Utilizou-se o Statistical Package for Social Science (SPSS) v. 25 for Windows® para as análises estatísticas. Foram realizados testes qui-quadrado e Mann-Whitney a 5% de significância, explorando associações entre variáveis categóricas e diferenças nas medianas dos escores de estresse.

**Resultados:** a amostra foi composta predominantemente homens (75,5%) e não brancos (63,7%), revelou 61,6% com mais de 15 anos de trabalho, 81,1% com renda acima de seis salários mínimos e 77,3% com ensino superior completo. Os policiais militares representaram a maioria (67,6%), sendo 72,2% pais, 57,9% consumidores de álcool e 9,3% fumantes. A maioria apresentou excesso de peso (77,3%). Associações estatísticas foram observadas entre circunferência da cintura e sintomas de estresse ( $p = 0,004$ ).

**Conclusão:** o estudo revelou uma ocorrência prevalente de adiposidade abdominal e estresse entre os agentes de segurança pública. Além disso, elucida uma prevalência significativa de excesso de peso na amostra, aliada a uma incidência pronunciada de sintomas de estresse. Estas descobertas sublinham uma relação complexa e mutuamente influente entre estas variáveis. No entanto, também enfatizam a necessidade de esforços de investigação mais amplas de modo a compreender o impacto do estresse nos indivíduos que trabalham em funções de agentes de segurança pública.

**Palavras-chave:** obesidade, estresse psicológico, agentes de segurança pública, ciências da nutrição, saúde pública.

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