

Correlation between nutritional state, blood pressure and waist circumference in sedentary women

Abstract

Introduction: It is well known that blood pressure and cardiovascular damage are related and how cardiovascular mortality is modified by the concomitance of other cardiovascular disease factors.

Objective: The aim of this study was to correlate the nutritional state, blood pressure and waist circumference in sedentary women.

Methods: Descriptive correlational research. The sample consisted of 17 adult women, non-practitioners of physical exercise, who lives in a townhouse in the west zone of Rio de Janeiro City, Brazil. The body composition variables measured were total body mass (BM), height (HT), waist circumference (WC). Body mass index (BMI) was calculated using the anthropometric measures obtained. Systolic and diastolic blood pressure (SBP and DBP) were measured on the day anthropometric measurements were collected using an OMRON HEM-7200 digital electronic sphygmomanometer. The volunteers should be at rest, seat in calm place for 15 minutes. Descriptive and inferential statistics was used, and *p*-value was 95% (*p*<0,05).

Results: It could be observed a significative and positive correlation between nutritional state and systolic and diastolic blood pressure. That means that 37% of the total variation of SBP and 28% of the DBP are explained by the BMI in this group. On the other hand, no correlation between waist circumference and blood pressure was observed (WC x SBP: $r=0.40$; $p=0.11$ and WC x DBP: 0.28 ; $p=0.26$).

Conclusion: Considering the relation between overweight and BP disorders, at this group, there was a significant positive correlation between nutritional state and blood pressure both SBP as well as DBP. So, the BMI is still a reasonably good measure of general adiposity and a significant risk factor for hypertension.

Keywords: sedentary behavior, women, risk factors

Volume 9 Issue 6 - 2019

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Received: October 22, 2019 | **Published:** November 11, 2019

Abbreviations: CVD, cardiovascular disease; BM, body mass; WC, waist circumference; BMI, body mass index

Introduction

Cardiovascular disease (CVD) is the leading cause of death worldwide.¹ Individuals with similar body mass index may have distinct metabolic and cardiovascular risk profiles. Susceptibility to obesity-related cardiometabolic complications is not solely mediated by overall body fat mass, but is largely dependent upon individual differences in regional body fat distribution and ability of subcutaneous adipose tissue to expand.² CVD risk factors, incidence and death increases comparing to women in reproductive age to menopausal. And a healthy lifestyle can prevent CVD, but it is unclear which lifestyle factors may help maintain and improve cardiovascular health for women after menopausal transition.³ Incident CVD events occurred in more middle-aged men and women in overweight (37% and 28%, respectively), obese (47% and 39%), and morbidly obese (65% and 48%) strata compared with adults in the normal Body Mass Index (BMI) group.⁴

It is well known that blood pressure and cardiovascular damage are related and how cardiovascular mortality is modified by the concomitance of other CVR factors.⁵ And the guidelines of the American College of Sports Medicine presented new evidence on several diagnostic and therapeutic aspects including lifestyle

modification to reduce cardiovascular risk (CVR).⁶ So, the aim of this study was to correlate the nutritional state, blood pressure and waist circumference in sedentary women.

Methods

Design

Descriptive correlational research.

Sample

The sample consisted of 17 adult women, non-practitioners of physical exercise, who lives in a townhouse in the west zone of Rio de Janeiro City, Brazil. Inclusion criteria: sedentary women according to American College of Sports Medicine,⁶ age between 25 and 35 years old. Exclusion criteria: non-volunteers to the study and women who practiced any physical active regularly. It was estimated a sample size of 23 individuals who were invited to participate in a physical exercise program. However, six women were excluded from the initial study because they were taking regular walks twice a week.

Ethics

The participants signed an informed consent document to participate in research involving human subjects in accordance with the Declaration of Helsinki.⁷ The research project was also approved

by the Ethics Committee in Research Involving Human Beings of Federal University of the State of Rio de Janeiro under protocol number 983.976/15.

Data collection

Body composition

The body composition variables measured were total body mass (BM), height (HT), waist circumference (WC). To assess total body mass and height, we used a mechanical balance with capacity of 150 kg and accuracy of 100 g and a Filizola® stadiometer (Brazil) respectively. Waist circumference was measured with a Sanny® anthropometric tape (Brazil). The procedures followed International Society for the Advancement of Kinanthropometry (ISAK) guidelines.⁸ Body mass index (BMI) was calculated using the anthropometric measures obtained. BMI was obtained by the ratio of body mass in kilograms to height in meters squared.⁹

Blood pressure

Systolic and diastolic blood pressure (SBP and DBP) were measured on the day anthropometric measurements were collected using an OMRON HEM-7200 digital electronic sphygmomanometer. The volunteers must be in rest, seat in calm place for 15 minutes.

Statistics

All the statistical procedures were processed with the Statistical Package for the Social Sciences software (SPSS 18.0, Chicago, USA). The sample size was calculated using the GPower 3.1 statistical program (Fraunhofer Universität Kiel, Germany), using as input an effect size of 0.8, α of 0.05 and estimated power of 0.95. The program estimated a sample size of 23 individuals, but only 17 concluded the physical exercise program. Descriptive statistics were used to establish the mean and standard deviation values. It was used the Shapiro-Wilk (SW) test and as the normality assumption was met, the Pearson Correlation Test was used for inferential analysis. The level of significance applied was $p < 0.05$.

Results

The sample descriptive characteristics are presented in Table 1. The Figure 1 presented the correlation between the nutritional state and systolic and diastolic blood pressure. It could be observed a significative and positive correlation between nutritional state and systolic and diastolic blood pressure. That means that 37% of the total variation of SBP and 28% of the DBP are explained by the BMI in this group. On the other hand, no correlation between waist circumference and blood pressure was observed (WC x SBP: $r = 0.40$; $p = 0.11$ and WC x DBP: $r = 0.28$; $p = 0.26$).

Table 1 Sample descriptive characteristics

	Age (years)	TBM (kg)	Height (m)	BMI (kg/m ²)	WC (cm)	PAS (mmHg)	PAD (mmHg)
Mean	30,9	78,4	1,7	28,6	86,5	129,5	78,0
SD	2,5	15,1	0,1	4,7	16,3	13,5	10,3
Minimum	27	54	1,54	19,13	60	110	63
Maximum	35	106	1,81	37,97	112	165	91
SW (p-value)				0,43	0,23	0,10	0,01

Legend: TBM, total body mass; BMI, body mass index; WC, waist circumference; SBP, systolic blood pressure; DBP, diastolic blood pressure.

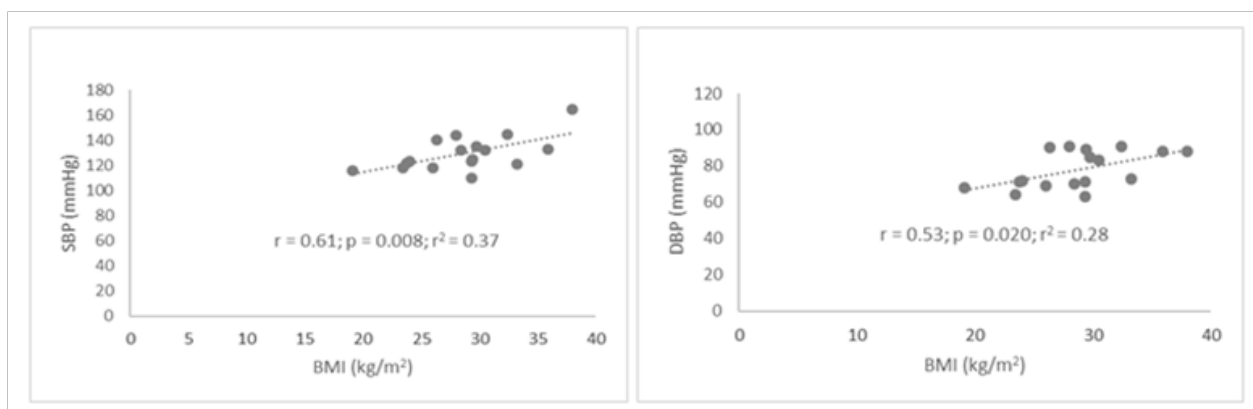


Figure 1 Correlation between blood pressure and nutritional state.

Discussion

Body mass index (BMI) is used as an indicator individual's nutritional status because of its relationship with the risk of mortality and morbidity of chronic diseases.^{10,11} However, it does not provide specific information on adiposity or body fat,¹² neither differentiate lean mass from fat mass nor fat distribution. It is important to mention that visceral adiposity plays a more important role in the development of insulin resistance and diabetes, than general adiposity, so the use of BMI as a unique indicator is not recommended.

Confirming this statement, the volunteers in the present study were classified as overweight based on BMI, however, waist circumference measurements do not represent a risk factor, since the maximum recommended value for women is 88cm and the volunteers presented an average of 86cm.¹³ But the blood pressure values were above the guidelines suggest by American College of Sports Medicine¹³ and American College of Cardiology/American Heart Association.¹⁴ Data indicate that low cardiorespiratory conditioning (caused by physical inactivity) and excessive accumulation of body fatness (especially visceral), are among the risk factors for the development of metabolic and cardiovascular diseases such as hypertension.^{13,15} In the overall population, the prevalence of hypertension was higher in overweight and obese participants compared to normal-weight subjects. Even if males were 1.9 times more likely to be hypertensive than females.¹⁶

Timpka et al.,¹⁷ suggests that the risk of chronic hypertension after history of hypertensive disorders of pregnancy might be markedly reduced by adherence to a beneficial lifestyle.¹⁷ In a cohort study, people with hypertension and diabetes had lower mean healthy lifestyle scores than those without disease. Women with incident hypertension from 2001 to 2011 had lower odds of improving their healthy lifestyle score during this time period compared to those without this disease.¹⁸ Healthy lifestyles are integral in preventing and treating common cardiovascular and metabolic diseases. So, it was suggested a behavior change and physical activity; promoting a positive health behavior (physical activity) rather than reducing a negative one (sedentary behavior).¹⁹

Conclusion

Considering the relation between overweight and BP disorders, although the BMI does not reflect body fat distribution, in this study, there was a significant positive correlation between nutritional state and blood pressure both SBP as well as DBP. BMI is still a reasonably good measure of general adiposity and a significant risk factor for increased risk of many chronic diseases as well as mortality.

Acknowledgements

None.

Conflict of interests

Author declares that we have no conflict of interest.

Funding details

None.

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