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Fatores associados à presença da cintura hipertrigliceridêmica em mulheres hipertensas e com excesso de peso

Factors associated with hypertriglyceridemic waist in hypertensive female with overweight

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RESUMO

Introdução: A cintura hipertrigliceridêmica é um preditor indireto do risco caridiometabólico.

Objetivo: Analisar os fatores associados à presença da cintura hipertrigliceridêmica em mulheres hipertensas e com excesso de peso.

Métodos: Trata-se de estudo transversal que incluiu mulheres hipertensas e com excesso de peso, com idades acima de 18 anos. Os pontos de cortes adotados para diagnóstico de cintura hipertrigliceridêmica seguiram os critérios do *National Cholesterol Evaluation Program for Adult Treatment Panel III* para o sexo feminino: circunferência da cintura ≥88 cm e triglicerídeos ≥ 150 mg/dL. Foram estimadas as razões de prevalência e seus respectivos intervalos de confiança de 95%. Para identificação dos fatores associados à cintura hipertrigliceridêmica foi utilizado o modelo de regressão logística e adotado um nível de significância de 5%.

Resultados: A presença da cintura hipertrigliceridêmica foi mais frequente entre as mulheres que fumavam (RP: 1,74; p = 0,003) e naquelas que apresentaram um escore de Framingham mais elevado (p < 0,001). Essas mulheres também apresentaram idade (p = 0,001) e parâmetros bioquímicos mais elevados, como glicemia (p = 0,001) e colesterol total (p = 0,007) e HDL mais baixo (p < 0,001). Após análise de regressão multivariada, as variáveis resultantes no modelo final foram: glicemia (p = 0,0242), colesterol total (p = 0,0004), HDL (p = 0,0007), idade (p = 0,0324) e hábito de fumar (p = 0,0218).

Conclusões: Os fatores associados significativamente à presença da cintura hipertrigliceridêmica na amostra estudada foram: hiperglicemia de jejum, hipercolesterolemia e baixos níveis séricos de HDL.

PALAVRAS CHAVES

Cintura Hipertrigliceridêmica. Fator de Risco. Obesidade Abdominal.

ABSTRACT

Introdution: Hypertriglyceridemic waist is an indirect predictor of caridiometabolic risk.

Objective: To analyze the factors associated to the presence of hypertriglyceridemic waist in hypertensive woman with overweight.

Methods: A transversal study that included hypertensive and overweight female, with ages above 18 years old. The limiting points for the hypertriglyceridemic waist diagnose followed the criteria established by the *National Cholesterol Evaluation Program for Adult Treatment Panel III,* for females: waist circumference of ≥ 88 cm and triglycerides ≥ 150 mg/dL. The prevalence reasons were estimated and their respective confidence intervals were of 95%. To identify the factors asso-

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ciated to hypertriglyceridemic waist were used as a logistic regression model adopting a significance level of 5%.

Results: The presence of hypertriglyceridemic waist was frequently seen in woman that smoked (PR: 1.74; p = 0.003) and for woman with higher Framingham scores (p < 0.001). These woman also presented age (p = 0.001) and biochemical parameters more elevated, such as glycemia (p = 0.001) and total cholesterol (p = 0.007) and lower high density lipoproteins (HDL) (p < 0.001). After multivariate regression analysis, the variables resulting from the final model were glycemia (p = 0.0242), total cholesterol (p = 0.0004), HDL (p = 0.0007), age (p =0.0324) and smoking habits (p = 0.0218).

Conclusions: The factors associated significantly to the presence of hypertriglyceridemic waist in the samples studied were: fasting hyperglycemia, hypercholesterolemia and low serum levels of HDL.

KEYWORDS

Hypertriglyceridemic waist, risk factor, abdominal obesity.

ABREVIATURAS

Designação Português Inglês

Quilograma/metro quadrado: Kg/m^2 Kg/m^2

Centímetro: cm cm

Miligramas: mg mg

Miligramas/decilitros: mg/dL mg/dL

Milímetros de mercúrio: mmHg mmHg

Quilograma: Kg Kg

Estatística

Teste t de Student: Teste t Test t

Intervalo de confiança: IC CI

Razão de prevalência: RP PR

Amplitude interquartil: AIQ IQA

Intervalo interquartil: IIQ IIQ

INTRODUCTION

In the last decade the prevalence of obesity and its association with cardiovascular diseases (CVD) has increased considerably worldwild[1], highlighting even more the clinical importance of abdominal obesity diagnosis in the identification of early cardiometabolic risk[2].

It is estimated that over 80% of the death cases by CVD are associated to well known risk factors[3] and, thus, the importance of the studies on cardiometabolic risk factors lays on the intervention of those considered modifiable, enabling the application of preventive measures before clinical symptoms emerge[4].

In order for the preventive measures to take place, a screening marker is needed in order to allow the identification of individuals with cardiovascular risk. To predict this risk, several factors considered emerging have been used[5], such as, the atherogenic metabolic triad which is characterized by elevated levels of apolipoprotein B, hyperinsulinemia and an increase in small and dense particles of low-density lipoproteins (LDL)[6].

A study developed in Canada by Lemieux et al[6] (2000) presented a cardiovascular risk marker able to diagnose indirectly the atherogenic metabolic triad. These authors show that there is a strong correlation between the waist circumference (WC) and increases concentrations of apolipoprotein B and hyperinsulinemia and, of the high serum triglycerides (TG) levels, with smaller and denser particles of LDL. Therefore, they named the simultaneous presence of increased WC with high levels of serum TG as hypertriglyceridemic waist (HW).

In Brasil, Cabral et al[7] (2012) analyzed cardiometabolic factors associated to HW in hypertensive woman. However, the scarcity of studies considering HW and the associated risk factors in woman, especially those overweight was a problematic to their study.

Therefore, considering the high prevalence of overweight (both overweight and obesity) and systemic arterial hypertension (SAH) among Brazilian woman[2,8], the significant association of these risk factors with HW and their clinical importance as predictor of indirect cardiometabolic risk; this study proposed to analyze the factors associated to HW in hypertensive woman with overweight.

METHODS

A transversal study approved by the Ethics Committee of the *Universidade Federal de Sergipe* with CAAE nº 02107412.9.0000.5546, was carried out. The population studied was of woman with ages over 18 years old, hypertensive and overweight (both overweight and obesity) using the Brazilian *Sistema Único de Saúde,* that seeked treatment in ambulatory. Sampling was carried out by convenience as long as the requirements for inclusion in the sampling group were fit.

For the sample volume calculus, a proportion of HW estimation on the Brazilian female population of 10.4%[9] with an absolute precision of 4 and a significance level of 5%, was used. Therefore, the sample size calculated was of 220 patients. 221 woman that met the requirements of the overweight and obesity by body mass index (BMI) classification WHO[10] (1995) and systemic hypertension, when use of antihypertensive medication was seen in their records, were in-

cluded. Pregnant, SIDA, cancer and nephropathies positive patients were excluded. Further, male patients were excluded due to the low incidence of male patients treated in the specialized secondary ambulatory used for the study.

For anthropometric evaluation weightings of the woman in a mechanical scale of platform type (Welmy®, Brazil) with maximum capacity of 150 kg and a 100 g precision, were carried out. Further, measuring in a wooden stadiometer, with a 0.1 cm resolution was also taken. The WC was measured with a non-elastic measuring tape with 0.1 cm precision (Arkus®, Brazil). All the techniques of data collection followed the suggestions of the Brazilian Health Ministry[11]. The BMI (kg/m^2) was used to classify excess of weight in woman with overweight (BMI ≥ 25,0 kg/m² and < 30,0 kg/m²) e obesity (IMC ≥ 30,0 kg/m²)[10].

Woman were considered hypertensive when they used regularly hypertensive according to their records. The arterial pressure (AP) was considered altered when: systolic AP ≥ 140 mmHg and diastolic AP ≥ 90 mmHg[12].

For biochemical evaluation, values of total cholesterol > 200 mg/dL, HDL < 40 mg/dL, LDL > 100 mg/dL and TG > 150 mg/dL; denominated cardiovascular risk factors for individuals with systemic hypertension according to the VI *Diretrizes Brasileira de Hipertensão*[12], were considered.

Smoking habits, alcohol consumption and physical activities habits were analyzed for the patients studied. These information were self-answered with yes/no alternatives. Further, the use of oral lipid-lowering according to medical prescription was also analyzed.

The Framingham risk score was analyzed to verify the cardiovascular risk level. Total score takes into consideration the following variables: age, smoking habit, HDL, LDL, diabetes, and systolic and diastolic arterial pressure. The score obtained corresponds to a probability of the coronary disease occurring in the next 10 years. Thus, woman classified in categories of low risk present a < 10% probability, medium risk is between 10 – 20 % and a high risk of cardiovascular events in 10 years is estimated for those with an >20% probability.

HW dependent factor, was considered variable outcome in this study. For the classification of woman presenting this marker, the NCEP – ATP III criteria was adopted, whose cutoff points are: WC ≥ 88 cm and TG ≥ 150 mg/dL.

Statistical analysis was carried out by R 3.2.3 software. The quantitative variable distribution was analyzed by the Shapiro Wilk test. It was seen that excluding age, all the independent variables (anthropometric and biochemical) present a non-parametric distribution. Therefore, the descriptive analysis of the sample studied was carried out by median and interquartile (MD + AIQ) amplitude for the quantitative variables and absolute and relative frequency for the qualitative variables. The prevalence ratios (PR) of the variables were estimated and considered among their confidence interval (CI) of 95%.

The analysis of the independent non-parametric variables among the two groups formed by the presence or absence of the HW was carried out by the Mann – Whitney test and for the analysis of the independent parametric variable (age), the Student *t*-test was used.

To estimate the presence of HW (variable focus of the study) by the independent variables a multivariate regression logistic was used as prediction model. The selection of variables was carried out by stepwise method by elimination and the initial inclusion criteria of these in the multivariate model was to present the association of p <0.05. The significance level adopted was of 5%.

RESULTS

221 woman with average age of 49 years were evaluated ($CI_{95\%}$= 47.5 to 50.9 years) and an average BMI of 37.8 Kg/m^2 (IIQ: 31.9 to 43.5), where 86% (190/221) were considered obese and 14% (31/221) were overweight. From these, 43% (95/221) presented HW, where 98% (216/221) presented WC over 88 cm, with a median of 108.5 cm (IIQ: 99.0 to 119.0 cm). In 43% (96/221) of the woman, the levels of triglycerides (Figure 1) were ≥ 150 mg/dL, with a median of 135 mg/dL (IIQ: 101 to 189 mg/dL).

The variables present in the final model were age (p =0.0324), glycemia (p = 0.0242), total cholesterol (p = 0.0004), HDL (p = 0.0007) and smoking (p = 0.0218).The regression model obtained by the method adopted was:

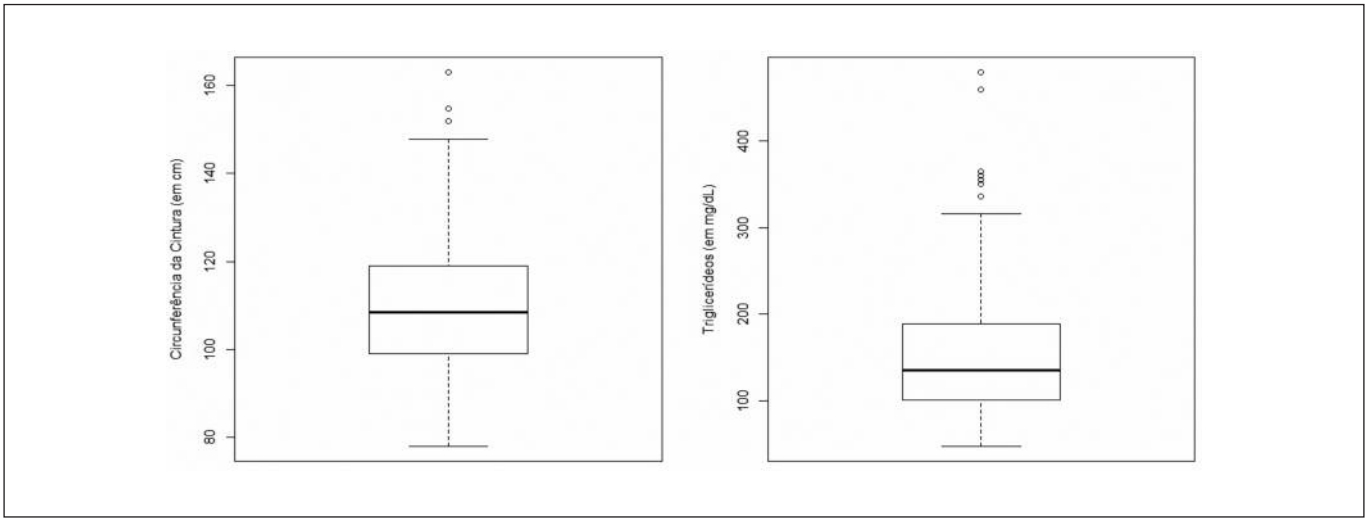
Logit (pi) = -2.983 + (0.027* age (years)) + (0.008 * Glycemia (mg/dL)) + (0.014 * Total Cholesterol (mg/dL)) - (0.053 * HDL (mg/dL)) + (1.042 * Smoking).

DISCUSSION

Leumiex et al (2000), showed a high correlation of CVD with increasing concentrations of apolipoprotein B and hyperinsulinemia and of elevated serum triglycerides levels in the presence of smaller particles and of greater density LDL-cholesterol. Thus, these authors call the simultaneous presence of increased WC and elevated serum triglyceride levels as HW and showed this marker as a diagnostic tool atherogenic metabolic triad, characterized by high levels of apolipoprotein B, hyperinsulinemia and increased particle concentrations small and dense LDL.

The results found in this study reveal a worse lipid profile among woman with HW, which presented significantly higher levels of total cholesterol, and lower HDL – cholesterol. These factors considered of cardiometabolic risk remained independent associated to the presence of HW, even after adjustments carried out in the multivariate logistic regression.

Figure 1. Waist circumference and triglycerides for the patients evaluated. Aracaju, Sergipe, 2016.



Previous studies found similar results to these[2,13]. Some, in fact, show that individuals with HW present Hypercholesterolemia and lower HDL – cholesterol in their average values[14,15]. The significant association of lower levels of HDL-cholesterol among woman with HW is a relevant factor to be considered, mainly because of its strong correlation to decrease of lipoprotein with presence of atherogenesis and increase in cardiovascular risk[16].

Increased levels of fasting glycemia is also associated to a significant presence of HW in the sample. Previous longitudinal study showed that a great proportion of men, and mainly woman with HW also presented intolerance to glucose or type II diabetes[14]. Studies in Brazil with hypertensive woman found significant association in HW and elevated levels of fasting glycemia[7] only in unvaried analysis. While, Esmailzadeh et al[15] (2006) studying Iranian teenagers did not find any significant association between Glycemia and HW in any of their tested models.

Recently, Queráles et al[17] (2014) found significant association to resistance to insulin with obesity and with abdominal obesity. According to Lemiux et al[6] (2000) the WC is strongly correlated to the visceral adipose tissue, suggesting that when this anthropometric measure is elevated, the subject has developed resistance to insulin. Carlsson, Risérus and Amlov[18] (2014) in their longitudinal analysis of elderly men initially without diabetes, found that the participant that presented HW showed a four-fold chance to developing diabetes in comparison to those with WC and normal TG. The higher frequency of elevated fasting glycemia levels in woman with HW, added to the fact that all of them presented overweight, are conditioning factors for a possible resistance to insulin in the sample studied.

From the factors studied related to lifestyle, HW was more frequent among woman who smoked, however did not remain associated to the presence of this marker in the multivariate logistic regression. Cabral et al[7] (2012) found initially a significant association of HW to smoking, however, after adjusted data analysis this correlation was not maintained.

Physical activity, can attenuate the elevation of risk factors in individuals with HW[19] and the use of lipid lowering medication favors the control of serum levels of LDL – cholesterol[20], being considered confusing variables of this study, however both were not associated to the presence of HW. Recent studies in China analyzed four distinct groups, finding that although the group with HW used more statins, they still presented higher BMI, WC and TG and lower levels of HDL, besides presenting a higher prevalence of SAH and diabetes when compared to other groups[21]. Therefore, supporting the present findings, the use of lipid lowering medication did not modify the situation of the individuals as for the presence of HW.

Altered arterial pressure (≥ 140/90 mmHg) did not present significant difference among woman with or without HW. Although literature affirms that among the risk factors for developing CVD, SAH is a main factor that exposes the individual to higher chances of presenting HW[15] and individuals with HW present higher prevalence of SAH[21]. It is important to consider that all woman studied used antihypertensive being, as should be highlighted, one of the criteria for inclusion in the study.

Framingham risk score identified 11% of the women studied with CVD risk and a higher percentage (24%) among those with HW. By analyzing the predictive of the Framingham risk score, Fernandes et al[22] (2015) found that this score was insufficient to adequately identify those individuals. Lemieux et al[6] (2000) showed that the chance ratio for CVD was of 1.1 in individuals with increased WC and normal TG; 2.5 for individuals with increased TG and normal WC;

Table 1. Lifestyle and clinical features of the woman evaluated. Aracaju, Sergipe, 2016.

	HW						PR	CI95%	p value
	Yes		No		Total				
	N	%	N	%	n	%			
Physical Activity									
Yes	52	55%	74	59%	126	57%	0.91	0.67-1.24	0.553
No	43	45%	52	41%	95	43%			
Smoking									
Yes	21	22%	10	8%	31	14%	1.74	1.29-2.35	0.003*
No	74	78%	116	92%	190	86%			
Alcohol									
Yes	17	18%	28	22%	45	20%	0.85	0.57-1.28	0.429
No	78	82%	98	78%	176	80%			
Lipid – lowering medication									
Yes	58	61%	76	60%	134	61%	1.02	0.75-1.39	0.912
No	37	39%	50	40%	87	39%			
PA									
Normal	73	77%	96	76%	169	76%	1.02	0.71-1.47	0.910
Altered	22	23%	30	24%	52	24%			
Framingham Risk Score									
High/Medium	23	24%	2	2%	25	11%	2.5	2.02-3.11	<0.001*
Low	72	76%	124	98%	196	89%			
Total	**95**	**100%**	**126**	**100%**	**221**	**100%**			

HW – hypertriglyceridemic waist; PR – prevalence ratio; CI – Confidence Index; AP – arterial pressure: normal (<140 mg/d) and altered (>140 mg/d); Framingham risk score: low (<10%) and average/high (>10%); *:significant p < 0.05.

and 3.6 for individuals with increased WC and TG (HW). Although Framingham risk score has shown significant association with the presence of HW, the woman from the sample studied already presented cardiometabolic risk factors associated, and therefore, this situation could have limited its predictive value. The presence of HW was more frequent among woman that presented higher Framingham risk score. This result was similar to previous studies relating Framingham risk score with HW marker in healthy woman[19], Canadian indigenous adults[23] and for non-smoking and non-diabetic man[24].

It is highlighted that the sample of woman studied were all obese and with overweight who presented increased WC more prevalently compared to elevated levels of TG. Poirier et al[23] (2015) also found a higher abdominal obesity prevalence in relation hypertriglyceridemia, considering that the population studied was not of individuals with overweight. Therefore, probably, the determining factor of HW in these woman studied were elevated fasting TG levels, considering that all of them presented overweight and high average BMI (compatible with moderate obesity)[10].

Patients with HW had higher ages. Consequently, the presence of HW was higher among older women, suggesting an increased cardiovascular risk with increasing age. Recently, a study in Iran showed that HW adjusted for age increased the

Figure 2. Idade e Escore de Framingham em relação à presença ou não de CHTG. Aracaju, SE, 2016.

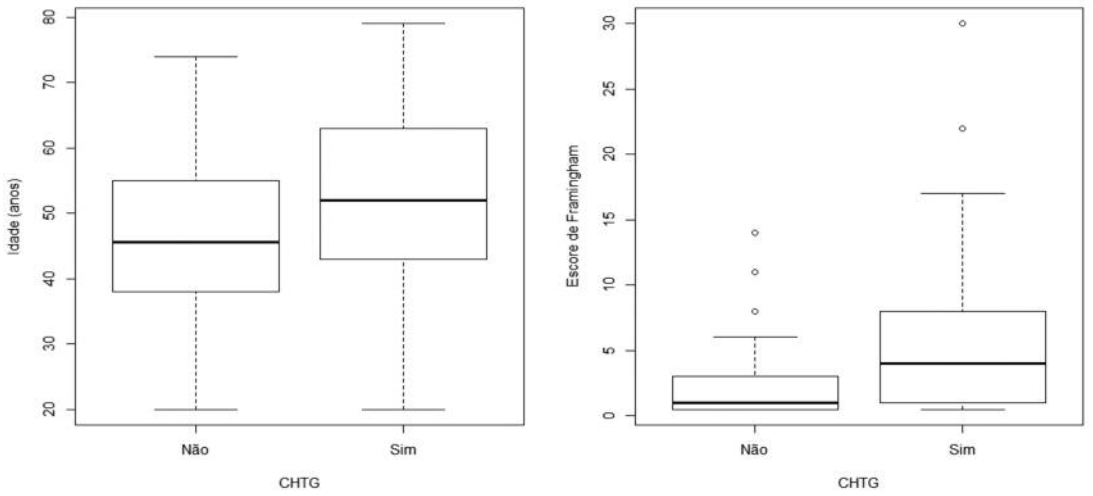


Table 2. Age, Framingham score and biochemical parameters in blood related to the presence or absence of HW. Aracaju, Sergipe, 2016.

	HW				W	Value p
	No		Yes			
	Median	IQA	Median	IQA		
Age (years)	45.50	17.0	52.00	20.0	4441.5	0,001[a]
Framingham Score	1.00	2.5	4.00	7.0	3396.0	< 0,001[b]
Glycemia (mg/dL)	93.00	22.5	102.00	52.5	4442.0	0.001[b]
Total Cholesterol (mg/dL)	183.00	27.1	196.00	49.5	4707.5	0.007[b]
LDL (mg/dL)	116.00	52.2	114.00	46.5	6067.0	0.863[b]
HDL (mg/dL)	47.50	11.8	43.00	13.0	7693.0	< 0.001[b]

* - T Student test; † - Test of Mann-Whitney; Significant for a p < 0.05 value; IQA - Amplitud Interquartil.

Table 3. Parameters selected for the final model with freedom levels and regression coefficient estimative, standard errors and chi-square tests. Aracaju, Sergipe, 2016.

Parameters	Estimative	Standard Error	Z	P value
Intercept	-1.9174	1.0425	-1.839	0.066
Glycemia (mg/dL)	0.0081	0.0036	2.264	0.024*
Total Cholesterol (mg/dL)	0.0106	0.0042	2.501	0.012*
HDL (mg/dL)	-0.0428	0.0158	-2.717	0.007*
Framingham risk score	0.1881	0.0438	4.290	< 0.001*

* Significant for a p < 0.05 value.

risk of incidence of CVD by 95% in the women studied[25]. Although this study has not assessed the relationship of HW with menopause, previous research has demonstrated a higher prevalence of HW and higher risk for CVD among women after menopause[26,27] and suggested that HW is a better cardiovascular risk indicator in women postmenopausal the NCEP-ATP III[26].

In fact, since this study was transversal, the associations observed may not present causality among themselves, since the determining variables and the outcomes were measured in a single moment. However, multivariate logistic regression showed that there is an independent association of cardiometabolic risk factors with the focus of the study HW, even after fitting.

Analyzing the factors associated to the presence of HW, this study allowed the construction of a prediction model able to identify individuals that can develop HW. Thus, contributing to the clinical preventive practice, mainly in the primary health care.

New studies in the intervention factors associated to the presence of HW in order to avoid major cardiometabolic alterations and cardiovascular commitments in populations that are still asymptomatic, are required. Further, association with other factors relating lifestyle (such as, quantification of smoking, alcohol consumption and physical activity) to the presence of HW, mainly over food consumption, are essential in weight and SAH control.

CONCLUSIONS

Factors associated to HW in hypertensive and overweight woman were those considered of cardiometabolic risk: fasting hyperglycemia, hypercholesterolemia and low serum levels of HDL. Finally, the associated with HW with FRS was also seen.

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