Metabolic syndrome, abdominal obesity, and cardiovascular risk in elderly women

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Abstract

Background: Metabolic syndrome and abdominal obesity are risk factors for cardiovascular diseases in middle age women but, not completely understood in older people. In this study we analyzed the association between metabolic syndrome and abdominal obesity and the occurrence of cardiovascular events in these elderly women.

Methods: A prospective follow-up study included 516 consecutive women aged 60–84 years who sought medical care at a geriatric outpatient facility. The presence of metabolic syndrome and higher quartiles of waist circumference and waist-to-hip ratio were analyzed as predictive variables, and were adjusted for age, smoking, and previous cardiovascular diseases. The outcomes were the occurrence of stroke, myocardial infarction, evidence of coronary artery disease, or cardiovascular death.

Results: During a mean follow-up of 6.6 years, 94 (18.2%) cardiovascular events were observed (48 fatal and 46 non-fatal). Metabolic syndrome was diagnosed in 206 women (39.9%). After adjustments for confounding variables, metabolic syndrome and waist-to-hip ratio above the 75th percentile (>0.98) were predictors of the outcomes, but greater waist circumference (>96 cm) was not. Adjusted hazard ratios for these variables were: metabolic syndrome, 1.66, 95% CI −1.11 to 2.47, $p=0.01$; waist-to-hip ratio, 1.72, 95% CI −1.05 to 2.82; $p=0.03$ and waist circumference, 1.37, 95% CI −0.91 to 2.07, $p=0.12$.

Conclusion: Metabolic syndrome and high waist-to-hip ratio were associated with increased risk of cardiovascular events in the studied sample.

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1. Introduction

Numerous studies have shown that anthropometric indices such as body mass index (BMI), waist circumference (WC), and waist-to-hip ratio (WHR) are associated with the presence of cardiovascular risk factors or adverse events [1].

Increased BMI shows variable relationships with cardiovascular disease, but has not been clearly identified as a predictor of cardiovascular risk in the elderly [2,3].

Metabolic syndrome, characterized by the association of different cardiovascular risk factors such as intolerance to glucose, abdominal obesity, dyslipidemia, and hypertension [4], is an important determinant of cardiovascular risk in middle-aged women [5–7], but its effects on the elderly population are still poorly understood. More importantly, waist circumference, which is used to measure abdominal obesity as part of the characterization of metabolic syndrome, may not be the ideal index to evaluate abdominal obesity in elderly women [3,8,9].

The role of abdominal adiposity indices as potentially better predictors than BMI for coronary heart disease and stroke events is suggested by some but not all studies

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[3,8,10]. There seem to be differences between the various anthropometric indices of abdominal obesity, such as waist circumference and WHR, when used as prognostic factors for cardiovascular disease. This may be due in part to characteristics of the studied population, including sex, age, and baseline cardiovascular risk. In fact, most studies were done primarily in middle-aged subjects, and the impact of total and abdominal adiposity in elderly women remains poorly defined.

Thus, the goal of the present longitudinal study was to evaluate the association between (1) metabolic syndrome and (2) abdominal obesity, assessed by waist circumference and waist-to-hip ratio, and the occurrence of cardiovascular events in elderly women that spontaneously sought medical care at an outpatient geriatric clinic.

2. Methods

2.1. Study design

A prospective cohort study with a 7-year follow-up period (baseline: July 1997 to July 1998; end: October 2004) was conducted.

2.2. Subject population

Subjects were female patients aged 60 years and older who spontaneously sought medical care for the first time at the Outpatient Geriatric Clinic of the University of Londrina Medical Center. Exclusion criteria were: age >84 years, being unable to stand up during the anthropometric evaluation, and diagnosis of cancer other than basal cell carcinoma or squamous cell carcinomas.

2.3. Measurements and baseline variables

Clinical evaluation included two supine blood pressure measurements and assessment of the following anthropometric parameters: weight (in kilograms), height (in meters), and waist circumference, and bi-iliac circumference (in centimeters), obtained with patients in the orthostatic position, wearing light attire without shoes and sweatshirts. The following anthropometric indicators were calculated: waist-to-hip ratio (WHR=waist circumference/bi-iliac circumference) and body mass index (BMI=weight/height [2]).

The following serum determinations were made from samples collected in the morning, after 12 h of fasting:

– glucose(glucose oxidase);
– total cholesterol, high-density lipoprotein-cholesterol (HDL-C), and triglycerides (enzymatic method);
– low-density lipoprotein-cholesterol (LDL-C) (estimation [11]).

After clinical assessment and complementary exams, the patients with previous cardiovascular diseases were identified according to the presence of coronary disease (infarction or angina), heart failure, atrial fibrillation, or stroke. Smoking was ranked into 3 categories: current, former, and nonsmoker.

For the diagnosis of the metabolic syndrome, at least 3 of the following alterations were taken into account: (1) hypertension (blood pressure $\geq 140/90$ mm Hg) or taking antihypertensive drugs; (2) hypertriglyceridemia (triglycerides ≥ 150 mg/dL); (3) HDL-cholesterol <50 mg/dL; (4) fasting glucose ≥ 110 mg/dL or previous diagnosis of diabetes mellitus; (5) waist circumference >88 cm [4].

2.4. Follow-up and outcome

Four of the 520 consecutive female patients evaluated during this period were excluded because of active neoplasia; 516 women were followed until October 30, 2004 (a 7-year follow-up). A partial analysis was carried out after 5 years of follow-up, but with different endpoints and variables [12].

Patients were evaluated every 6 months in order to identify fatal and non-fatal events. Follow-up was carried out by researchers only, and was done either at the Outpatient Clinic or by consulting health facility records. A positive outcome was defined as the first occurrence of at least 1 of the following cardiovascular events:

(a) *Stroke*: fatal or non-fatal events of ischemic or hemorrhagic origin, confirmed by brain computed tomography scans or magnetic resonance imaging, in which patients presented with neurological symptoms lasting for at least 24 h and were referred for hospital admission;
(b) *Coronary artery disease*: confirmed by at least 1 of the following complementary examinations: stress testing, myocardial scintigraphy, cardiac catheterization, or angioplasty;
(c) *Myocardial infarction (MI)*: fatal or non-fatal, confirmed by clinical and laboratory criteria;
(d) *Cardiovascular mortality*: the following were considered as cardiovascular death:
  • A death certificate with a cardiovascular disease as the underlying cause of death according to the Tenth Edition of the International Classification of Diseases (ICD-10) [13];
  • Sudden death characterized as taking place up to 1 h after the onset of symptoms, with a cardiovascular cause as the only evidence.

2.5. Ethical aspects

This study was approved by the Ethics Committee of the University of Londrina, and all patients provided written informed consent at the beginning of follow-up.