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Original Article

Prevalence of metabolic syndrome and prediabetes in an urban population of Guayaquil, Ecuador[☆]



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ABSTRACT

Aims: To determine the prevalence of metabolic syndrome and prediabetes in a population of the city of Guayaquil, Ecuador, aged 55–65 years; to observe if there are differences in prevalence between males and females, and to describe the frequency with which each component of the metabolic syndrome is found in this population.

Materials and methods: population-based cross-sectional study in Guayaquil. We recruited people of both genders, with ages ranging from 55 to 65 years. Through clinical history, physical examination and laboratory tests, we obtained necessary data to diagnose metabolic syndrome and/or prediabetes. Statistical analysis was performed using SPSS[®] 22.

Results: we obtained a sample of 213 patients, 64.5% were females and 35.5% were males. Mean age was 60.3 years (± 3.1). A total 65.8% of patients had increased waist circumference, and 45% were diagnosed with metabolic syndrome. Hypertriglyceridemia was the most prevalent condition in males, while women more commonly had low HDL. Prediabetes was diagnosed in 45.9% of our patients, and 19.5% had both disorders. There was no significant difference on metabolic syndrome prevalence between genders, but prediabetes was significantly more common in women.

Conclusion: we found a high prevalence of metabolic syndrome and prediabetes in Guayaquil, higher than what was reported in other areas. Abdominal obesity is even more prevalent. Women have prediabetes more frequently than men. Our patients, given their age, are at higher risk of cardiovascular disease and cognitive decline by having metabolic syndrome and/or prediabetes.

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1. Introduction

Metabolic syndrome, or X syndrome, is a group of cardio-metabolic conditions that, when present, significantly increase the risk of cardiovascular mortality [1,2]. It is associated with a proinflammatory and prothrombotic state, doubling the chances of suffering a myocardial infarction or cerebrovascular event [3–5]. It is currently considered a worldwide pandemic, given the high prevalence of this and other associated risk factors, and it is estimated that 20–30% of the population worldwide has this syndrome [3,6–8].

Diagnosis of metabolic syndrome is based on the presence of abdominal obesity (as determined by waist circumference increased above the limits for each sex), plus two of four additional criteria established by the International Diabetes Federation (IDF), including diabetes or hyperglycemia, hypertension, hypertriglyceridemia and low HDL cholesterol [8,9]. Abdominal obesity is the only obligatory criteria. On the other hand, there is a state of insulin resistance prior to the establishment of diabetes mellitus, recognized by the American Diabetes Association (ADA), which is now known as prediabetes [10]. It is characterized by high levels of glucose or glycated hemoglobin, without reaching the limits necessary to diagnose diabetes, and is composed of two conditions: impaired fasting glucose and impaired glucose tolerance [11,12]. Timely and proper identification of prediabetes is critical, since it is a treatable condition, in which proper management can delay or prevent the onset of diabetes [11]. The IDF criteria for metabolic syndrome and ADA criteria for prediabetes are presented in Table 1.

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Table 1
Criteria for the diagnosis of metabolic syndrome and prediabetes.

Criteria	Reference values
Metabolic syndrome (IDF criteria)	
Increased waist circumference	Inferior limit varies according to population, for both men and women
Hyperglycemia or diabetes	Fasting glycaemia ≥ 100 mg/dl, or diagnosed diabetes
Hypertension	Blood pressure $\geq 130/85$, or being treated for hypertension
High triglycerides	≥ 150 mg/dl
Low HDL cholesterol	Women: ≤ 50 mg/dl Men: ≤ 40 mg/dl
Prediabetes (ADA criteria)	
Hyperglycemia	Fasting glycaemia ≥ 100 and ≤ 125 mg/dl
Glycated hemoglobin	5.7–6.4%

Source: International Diabetes Federation (1), American Diabetes Association [10].

In Ecuador, there have been several studies on the prevalence of metabolic syndrome, perhaps the best known being the studies conducted by Del Brutto et al. in the rural population of Atahualpa, in the coast of the country [13,14]. However, recent studies in our population suggest that, in addition to increased cardiovascular risk, metabolic syndrome may be associated with cognitive impairment in older patients [15]. For this reason, it is important to determine the prevalence and characteristics of metabolic syndrome in patients who are close to becoming of old age. Moreover, so far no studies have been done on the prevalence of prediabetes in our country. The aim of this study is to determine the prevalence of metabolic syndrome and prediabetes in the population of the city of Guayaquil who are between 55 and 65 years of age. Also, we seek to determine the frequency with which each component of the metabolic syndrome occurs, and observe if there are differences in prevalence between males and females in this population.

2. Methods

We conducted a cross-sectional, population-based, descriptive and analytical study, carried out in the city of Guayaquil, Ecuador, between July and December 2015. We included outpatient volunteers of both gender, aged between 55 and 65 years. This study was approved by the ethics committee of Clínica Kennedy Hospital. The participants were properly informed of the purposes

of the study and the publication of results in the future, and signed their consent to participate.

During recruitment patients were asked about prior history of hypertension or diabetes mellitus, and a brief physical examination including measurements of waist circumference and brachial blood pressure was performed. Then, participants were cited to the laboratory to perform fasting blood tests, in order to measure blood glucose levels, glycated hemoglobin, and lipid profile (total cholesterol, LDL, HDL, and triglycerides). The results were compiled by our research team.

We use the IDF criteria to diagnose metabolic syndrome. However, for the determination of increased abdominal girth, we used the values recommended by the consensus of the Latin American Diabetes Association (ALAD), which places the cutoff point for Latino populations at 88 cm in women and 94 cm for men [16]. To determine the presence of prediabetes we used the ADA criteria, based on the laboratory results obtained. Data was entered to a database in SPSS[®] 22 software (IBM Corporation, USA), where the statistical analysis of frequencies and percentages was performed. The chi-square test was used to determine differences in prevalence between men and women, accepting a p value of <0.5 as significant.

3. Results

A total of 231 patients were included in the study, of whom 149 (64.5%) were female and 82 (35.5%) were male. Mean age was 60.3 years ($SD \pm 3.1$). In our sample, 101 patients (43.7%) had hypertension and 67 (29%) had diabetes mellitus, while 33 (14.3%) were suffering from both diseases simultaneously.

After applying IDF criteria, 104 (45%) of our patients were diagnosed with metabolic syndrome, no significant difference was found between males and females ($p = 0.98$). Mean waist circumference for males was 99.6 cm ($SD \pm 10.9$), and 92.7 cm ($SD \pm 10.2$) for females. In total, 152 patients (65.8%) had an increased waist circumference by ALAD criteria, meaning that 68.4% of the patients with abdominal obesity had definitive metabolic syndrome. The frequency with which each of the components of metabolic syndrome was present in our sample, both globally and divided by gender, is displayed in Table 2, where we also show the prevalence of each diagnostic criteria in patients with abdominal obesity. We did not find statistically significant differences for any of the components of metabolic syndrome between genders ($p > 0.05$).

The diagnosis of prediabetes was present in 106 (45.9%) of our patients, and a significant difference ($p < 0.001$) was found in prevalence for the female gender. A total of 45 (19.5%) patients had metabolic syndrome and prediabetes simultaneously, obtaining

Table 2
Frequency of each metabolic syndrome component, divided by total of included subjects, total of patients with abdominal obesity, and stratified by gender.

Diagnostic criteria	By patient total ($n = 231$)	By patients with abdominal obesity ($n = 152$)	By total of male patients ($n = 82$)	By total of female patients ($n = 149$)
Increased waist circumference	152 (65.8%)	152 (100%)	55 (67.1%)	97 (65.1%)
Diabetes o hyperglycemia	103 (44.6%)	79 (52%)	40 (48.8%)	66 (44.3%)
Hypertension	101 (43.7%)	74 (48.7%)	35 (42.7%)	63 (42.3%)
High triglycerides	126 (54.5%)	87 (57.2%)	49 (59.8%)	77 (51.7%)
Low HDL cholesterol	123 (53.2%)	84 (55.3%)	37 (45.1%)	86 (57.7%)

Table 3
Frequency of the diagnosis of metabolic syndrome, prediabetes, and both diseases simultaneously, divided by gender.

Diagnosis	Males		Females	
	n	%	n	%
Metabolic syndrome	37	35.6%	67	64.4%
Prediabetes	24	22.6%	82	77.4%
Prediabetes + metabolic syndrome	10	22.2%	35	77.8%

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