Original research

Prevalence of diabetes in three regions of Venezuela. The VEMSOLS study results

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ABSTRACT

Objective: The prevalence of diabetes in multiple regions of Venezuela is unknown. To determine the prevalence of diabetes in five populations from three regions of Venezuela.

Methods: During 2006–2010, 1334 subjects ≥20 years were selected by multistage stratified random sampling from all households from 3 regions of Venezuela. Anthropometric measurements and biochemical analysis were obtained. Statistical methods were calculated using SPSS 20 software.

Findings: Mean (SE) age was 44.8 years (0.39) and 68.5% were females. The prevalence of diabetes was 8.3% (95% CI, 6.9%–10.0%), higher in men than women (11.2% and 7.0% respectively; p = 0.01). The prevalence adjusted by age and gender was 8.0% (95% CI, 6.9%–9.9%). This figure increased with age, with the lowest prevalence in the 20–29 year old group (1.8% [95% CI, 0.6%–4.8%]) and the highest in the oldest group (26.8% [95% CI, 16.2%–40.5%]). Subjects with overweight or obesity had no increased risk of diabetes compared with those with normal weight. However, in women, the presence of abdominal obesity was associated with an increase in the risk of diabetes by 77% (OR 1.77 [95% CI, 1.1%–2.9%]). The
prevalence of prediabetes was 14.6% (95% CI, 12.8%–16.7%), and only 48.2% were aware of their diabetes condition.

Conclusion: In this study, 8.3% of the subjects had diabetes and 14.6% prediabetes. Less than half of the subjects with diabetes were aware of their condition. These results point to a major public health problem, requiring the implementation of diabetes prevention programs.

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1. Introduction

Diabetes is a major cause of morbidity and mortality in the world and prevalence rates have been increasing over the last decades, especially in developing countries [1]. In Venezuela, diabetes is the fourth leading cause of death and increased 74.7% from 2005 to 2016 [2]. By 2016, diabetes is also the fourth cause of deaths and disability-adjusted life years (DALY; sum of years lived with disability and years of life lost) combined in Venezuela [2,3]. Improved epidemiologic knowledge of diabetes is a priority in order to formulate and implement successful public health care policies to prevent and control diabetes complications.

There is relatively little diabetes prevalence information in Venezuela. Some studies with different methodologies have been reported, but none includes more than one region of the country, which is distinctly advantageous compared with using aggregate data from the entire country. The largest population-based study in Zulia region was focused on metabolic syndrome prevalence but also reported, based on fasting glucose values ≥126 mg/dl, a diabetes prevalence of 7.8% in men and 7.4% in women [4]. The Cardiovascular Risk Factor Multiple Evaluation in Latin America (CARMELA) [5] study designed to systematically compare cardiovascular risk factors in seven major Latin American cities, reported a diabetes prevalence of 6.0% in Barquisimeto city, in the western region of Venezuela.

The need to report the cardiometabolic risk factor prevalence rates in multiple regions of Venezuela, prompted design of the Venezuelan Metabolic Syndrome, Obesity and Lifestyle Study (VEMSOLS). This paper presents the results of VEMSOLS, specifically, the diabetes prevalence in five populations of three regions of Venezuela.

2. Methods

2.1. Design and subjects

An observational, cross-sectional study was designed to determine the prevalence of cardiometabolic risk factors in a subnational sample of three regions of Venezuela. Five municipalities were evaluated in three regions from Venezuela: Palavecino Municipality in Lara State (urban) from the Western region; Ejido Municipality (Merida city) in Merida State (urban) and Rangel Municipality (Páramo area) in Merida State (rural), both from the Andes region; and Catia Municipality in Vargas state (urban) and Sucre Municipality in Capital District (urban), both from Capital region. During the years 2006–2010, a total of 1334 subjects aged 20 or older that had lived in their houses at least six months were selected by bi-stages random sampling. Three different regions of the country – Andes, mountains at the south; Western, llanos in the middle; and Capital District, coast at the north – were assessed. Each region was stratified by municipalities and one or two were randomly selected. Map and census of each location were required to delimit the streets or blocks, and to select the households to visit in each municipality. After selecting the sector to be surveyed at each location, the visits to households started from number 1 onwards skipping every two houses. Pregnant women and participants unable to stand up and/or communicate verbally were excluded. All participants signed the informed consent of participation.

The sample size was calculated using the statistical Software EPI-INFO 3 (Centers for Disease Control and Prevention (CDC). Released 2003. Atlanta, Georgia: USA) to detect a hypercholesterolemia prevalence (the lowest prevalent condition reported in Venezuela) of 5.7% [6] with a standard deviation of 1.55%, which allows to calculate a 95% confidence interval (95% CI). The minimal estimated number of subjects to be evaluated was 830. Overall, 1334 subjects were evaluated (89.6% urban and 10.4% rural area).

2.2. Clinical and biochemical data

All subjects were evaluated in their home or in a nearby health center by a trained health care team according to a standardized protocol. Each home was visited twice. In the first visit, the participants received information about the study and written informed consent was obtained. Demographic and clinical information was obtained using a standardized questionnaire. Blood pressure was measured twice in the right arm supported to the heart level in sitting position, after five minutes of rest, with a calibrated aneroid sphygmomanometer. Weight was measured with the fewest clothes possible, without shoes, using a calibrated scale. Height was measured using a metric tape on the wall. Body mass index (BMI; weight [kg]/height [m]²) was calculated.

In the second visit, blood samples were drawn after 12 h of overnight fasting. Then, they were centrifuged during 15 min at 3000 rpm within 30–40 min after collection and were transported in dry ice to the central laboratory where they were properly stored at −40 °C until analysis. Questionnaire information from participants absent during the first visit was collected. Plasma glucose [7], total cholesterol [8], triglycerides [9], and high density lipoprotein cholesterol (HDL-c) [10] were
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