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Metabolic Syndrome and Body Composition measurements in Blue-Collar Workers from a Metal-Mechanic Factory in Soledad. Preliminary Report

Síndrome Metabólico y Mediciones de la Composición Corporal en Trabajadores de una Planta Metal-Mecánica en Soledad. Reporte Preliminar

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Abstract

Introduction*: Data regarding the incidence of MetS and the relationship with some body composition measurements in blue-collar workers from Soledad were obtained, as part of a wider research.*
Methods*: Data on weight (W), height (H), BMI, waist, hip, WHR, percentage of body fat (%BF), fat mass, blood pressure (BP), fasting blood glucose (FBG), total cholesterol (TC), high density lipoprotein HDL), low density lipoprotein (LDL), very-low density lipoprotein (VLDL) and triglycerides (TG) were obtained from 236 male blue-collar workers in a metal-mechanic factory at Soledad, a municipality of Departamento del Atlántico in the Caribbean coast of Colombia. The Adult Treatment Panel III (2001) definition for metabolic syndrome was used. Metabolic Syndrome components (MetS) and correlations with body composition measurements were calculated.*
Results*: The overall prevalence of metabolic syndrome was 20.7% (95%CI=15%, 26%). Waist circumference above 102 cm. was found in 11.8% (95%CI=7.5%, 16.2%); 43.2% (95%CI=36.6%, 49.7%) had triglycerides levels greater than 150 mg/dl., blood pressure ≥ 130/85 was found in 10.2% (95%CI=6.1%, 14.2%) and FBG >100 mg/dl in 10.5% (95%CI=6.4%, 14.7%). BMI and %BF correlates well with waist, BP, FBG and TG.*
Conclusions*: Prevalence of MetS in this blue-collar workers' sample at Soledad is in agreement with other papers published in Colombia, as well as in other countries. Abdominal obesity was below the national data. In this population, BMI and %BF could be a good proxy to evaluate MetS.*
Key words: Metabolic syndrome; blue-collar workers; body composition; Colombia.

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Resumen

***Introducción**: Se obtuvo un conjunto de datos, como parte de una investigación más amplia, en relación a la incidencia de Síndrome Metabólico (SM) y su relación con algunas mediciones de composición corporal en trabajadores en Soledad.*
***Métodos**: Se registraron los datos del peso (P), talla (T), Indice de Masa Corporal (IMC), cintura, cadera, Indice Cintura-Cadera (ICC), porcentaje de grasa corporal (%GC), masa grasa, presión arterial (PA), glucosa sanguínea en ayunas (GSA), colesterol total (CT), lipoproteínas de alta densidad (LAD), lipoproteínas de baja densidad (LBD), lipoproteínas de muy baja densidad (LMBD) y triglicéridos (TG) en 236 obreros de una fábrica metalmecánica en Soledad, municipio del Departamento del Atlántico en la costa caribe Colombiana. Se utilizó para definir el Síndrome Metabólico (SM) los criterios del Adult Treatment Panel III (2001). Se calcularon los componentes del SM y las correlaciones con las mediciones de la composición corporal.*
***Resultados**: La prevalencia global del Síndrome Metabólico fue de 20.7% (95%CI=15%, 26%). La circunferencia de la cintura por encima de 102cm. se encontró en 11.8% (95%CI=7.5%, 16.2%); 43.2% (95%CI=36.6%, 49.7%) tenían niveles de triglicéridos mayores a 150mg/dl; la presión sanguínea ≥ 130/85 se encontró en 10.2% de los casos (95%CI=6.1%, 14.2%) y la GSA >100 mg/dl en 10.5% (95%CI=6.4%, 14.7%). El IMC y el %GC se correlacionaron bien con la cintura, la presión arterial, la glucosa sanguínea en ayunas y los triglicéridos.*
***Conclusiones**: La prevalencia de SM entre los obreros en esta muestra en Soledad, está de acuerdo con otros trabajos publicados en Colombia, así como en otros países. La obesidad abdominal estuvo por debajo de los datos nacionales. En esta población, el IMC y el %GC pudieran ser un buen aproximado para evaluar el SM*
Palabras clave: Síndrome Metabólico, trabajadores, Composición Corporal, Colombia.

INTRODUCTION

Metabolic Syndrome is defined by a constellation of an interconnected physiological, biochemical, clinical and metabolic factors that directly increase the risk of atherosclerotic cardiovascular disease, diabetes and all cause mortality (1). In Colombia, several papers have been published assessing the prevalence of metabolic syndrome (MetS) in specific subgroups of the population (2-9) but to the best of our knowledge there are no reports published in the country regarding the relationship between MetS and body composition in blue-collar workers.

The goal of this preliminary report was to describe values and relationships between some anthropometric and metabolic variables in a metal-mechanic factory in the Colombian Caribbean coast.

MATERIAL AND METHODS

Two hundred thirty-six male blue-collar workers in a metal-mechanic factory at Soledad (a municipality of Departamento del Atlántico in the Caribbean coast of Colombia, South America) participated in this study. All the individuals who participated did so voluntarily and a written consent was read and signed by each of them and delivered to the research staff. Ethical approval was obtained from the Universidad del Norte Health Sciences Division Committee.

Metabolic syndrome was defined according to the Adult Treatment Panel III (10). Blood pressure (BP) was measured following recommended procedures (11). Blood samples after 12 hours overnight fasting period was drawn for lipid testing by registered nurses at the factory infirmary and delivered to a certified laboratory for analysis, where the enzymatically determination of total serum cholesterol (TC), High Density Lipoprotein (HDL), Low Density Lipoprotein (LDL), Very Low Density Lipoprotein (VLDL), Triglycerides (TG) and Fasting Blood Glucose (FBG) were carried out according to the laboratory standard procedure.

Height was measured in centimeters with a portable stadiometer (Holtain Ltd. UK); waist circumference was measured in centimeters with a non-stretchable measuring tape 1 cm above the iliac crest and the reading was taken at the end of a normal expiration and hip circumference was measured with the tape around the point with the maximum circumference over the buttocks.

Waist and hip measurements were taken by duplicate, in light underwear, and the average was used as definitive. Waist-Hip Ratio (WHR) was calculated from these two measurements.

Weight, Body Mass Index (BMI), fat mass (FM), % body fat (%BF) and Basal Metabolic Rate (BMR) were obtained using Tanita's BIA (Bioelectrical Impedance Analyzer) model 310 A (Tanita Corporation, Tokyo, Japan T174). Participants with metabolic disturbances were excluded. A strip of paper and a code number with each participant's data was recorded.

Data analysis was performed using SPSS statistical package, version 21 (IBM Software Group, Chicago, IL). Mean and standard deviation of all measurements were obtained. Correlations between measurements of body composition and components of metabolic syndrome were analyzed using linear regression.

RESULTS

Mean, standard deviation, minimum and maximum values of all measurements are listed in Tables 1 and 2 summarize the prevalence of metabolic syndrome among blue-collar workers.

Waist circumference above 102 cm. was found in 11.8% (95%CI=7.5%, 16.2%); 43.2% (95%CI=36.6%, 49.7%) had triglycerides levels higher than 150 mg/dl., blood pressure ≥ 130/85 was found in 10.2% (95%CI=6.1%, 14.2%) and FBG >100 mg/dl in 10.5% (95%CI=6.4%, 14.7%). The overall prevalence of metabolic syndrome was 20.7% (95%CI=15%, 26%). Body composition measurements and metabolic syndrome components correlations are listed in Table 3. BMI and %BF correlates well with waist, BP, FBG and TG. There were no associations between HDL and body composition measurements and all subjects had HDL above 40 mg/dl, which is intended as the effect of intensive physical activity.

DISCUSSION

Obesity in the developing world can no longer be considered solely as a disease of groups of higher socioeconomic status groups (12,13) and in both sexes, lower socioeconomic position across life was associated with higher fat mass and higher android to gynoid ratio

in early old age (12). Abdominal obesity is one of the clustering factors, which define metabolic syndrome (14). Studies from Europe and the USA found that blue-collar workers had three-times the risk of CVD (15) and ischemic heart disease (16,17) compared with white-collar workers.

Several papers have been published in Colombia providing data about the prevalence of metabolic syndrome (MetS) (2-5,8,18-21). The results are controversial due to differences among regions in the country and definition criteria: (1) In a survey of cardiovascular risks applied to 99 adults in the Caribbean coast of the country, 49.5% of the subjects had MetS according to the International Diabetes Foundation, 41.4% according to the American Heart Association, and 20.2% according to the American Treatment Panel III (22); (2) in Antioquia (a northwest Department) in two different cross-sectional studies conducted in 285 medical staff volunteers (29.1% male) aged 20-61 years and 3000 adults aged 25-64 years from Medellin and surrounding municipalities, global prevalence of MetS was 17.5% (19) and 41% (21) respectively and; (3) in the southwest, a cross-sectional study in 89 working women aged 25-64 years from the public and private sectors, 23% had MetS (8). The reported prevalence of MetS varies depending on the definition used, age, sex, socioeconomic status, and the ethnic background of study cohorts (23). In this preliminary report, 20.7% of the blue-collar workers had MetS, which is in agreement with data reported in the same area (22) as well as in the general population in the United States (23.7%) using Adult Treatment Panel-III criteria (24) and in Korean male blue-collar workers (25,26).

Metabolic syndrome alone cannot predict global cardiovascular disease risk, but abdominal obesity - the most prevalent manifestation of metabolic syndrome - is a marker of 'dysfunctional adipose tissue', and is of central importance in clinical diagnosis (27,28). In this population, BMI and %BF correlate well with waist, BP, FBG and TG and could be a good proxy to evaluate MetS. Visceral fat, which correlates well with waist circumference, is associated with higher insulin resistance and smaller LDL and HDL particle size (29). Abdominal obesity (AO) was 11.8% in this population, which is lower than it was reported in a similar environment, a metal-mechanic factory in Cali (28%) and national data, which accounts for 39% in men aged 18-64 years (20). It may be hypothesized that the socio-economic differences among regions in Colombia explain these findings (30). The scarcity of national data on the metabolic syndrome in blue-collar workers makes difficult to compare the results of this study locally.

LIMITATIONS

This was a pilot study whose main objective was to establish an initial assessment of the problem of metabolic syndrome in blue-collar workers in the Caribbean region. The research aims to cover in a second phase a wider sample in order to obtain regional reference values and educate workers on lifestyles and healthy eating.

CONCLUSIONS

Prevalence of MetS in blue-collar workers at Soledad, Colombia, is in agreement with other reports published on the general population in the country. Abdominal obesity, according with the cut-off values used in this report,

was below the national data. The correlations between MetS components and a set of body composition variables were in general strong and positive.

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