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ORIGINAL ARTICLE

Revised waist circumference cut-off points for the criteria of abdominal obesity in the Spanish population: Multicenter nationwide Spanish population based study

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KEYWORDS
Abdominal obesity;
Waist-circumference;
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Abstract
Aims: To investigate the optimal waist circumference (WC) cut-off points in the general Spanish-population and its relationships with insulin resistance (IR) and metabolic syndrome (MS) due to the disparity of values WC in the different regional areas.
Methods: A multicenter nationwide Spanish population based study on 3844 unrelated subjects, aged 35–74 years. Receiver operating characteristic (ROC) curve was analysed to identify the optimal WC cut-off points for detecting metabolic abnormalities related to the MS.
Results: The prevalence of MS, International Diabetes Federation (IDF) criteria: 29.1%/33.1% in males/females ($P = .004$), Adult Treatment Panel III (ATPIII) criteria: 23.5%/30.9% males/females ($P < .001$).

Optimal WC cut-off to obtain the maximal sensitivity and specificity for detecting two or more of the other metabolic abnormalities associated with MS or IR was 94.5/89.5 cm in males/females. According to these cut-off points, the prevalence of abdominal-obesity was 57.2%/61.3% in males/females, $P = .011$ and prevalence of MS was similar in both genders (males/females: 27.9%/28.9%, $P = .527$).

The Spearman correlation coefficient relating WC to HOMA IR was 0.395. IR was similarly prevalent in males/females 24.1%/21.7% ($P < .088$). Prevalence of IR was 43% in subjects with MS by IDF criteria.
Conclusions: The new WC cut-off points found in our population were 94.5/89.5 cm for males/females. For males, the cut-off points were lower than those defined by ATPIII but similar to IDF criteria. For females these cut-off points were higher than those proposed by ATPIII/IDF criteria.

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PALABRAS CLAVE
Obesidad abdominal;
Circunferencia de la cintura;
Síndrome Metabólico

Revisión de los puntos de corte de la circunferencia de la cintura como criterio de obesidad abdominal en la población española: estudio nacional multicéntrico

Resumen
Objetivos: Investigar los puntos de corte óptimos para la circumferencia de la cintura (CC) en la población general española y su relación con resistencia a la insulina (RI) y Síndrome Metabólico (SM), debido a la disparidad de valores de la CC en las diferentes áreas.
Métodos: Estudio multicéntrico a nivel nacional: se estudiaron 3,844 sujetos no relacionados, de 35-74 años. Se aplicó la curva COR (Curva de rendimiento diagnóstico) para identificar los puntos de corte óptimos para la CC para la detección de anormalidades metabólicas relacionadas con el SM.
Resultados: La prevalencia de SM, criterio IDF: 29.1%/33.1% varones/mujeres (p= 0.004), criterio ATPIII: 23.5%/30.9% varones/mujeres (p< 0.001).

El punto de corte óptimo para la CC con máxima sensibilidad y especificidad para detectar 2 o más anormalidades metabólicas asociadas con SM o RI fue 94.5 cm/89.5 cm en varones/mujeres. De acuerdo con estos puntos de corte la prevalencia de obesidad-abdominal fue de 57.2%/61.3% en varones/mujeres, p= 0.011 y la prevalencia de SM fue similar en ambos sexos (varones/mujeres: 27.9%/28.9%, p = 0.527).

El coeficiente de correlación de Spearman en relación a CC con RI fue 0.395. La prevalencia de RI fue similar en varones/mujeres: 24.1%/21.7% (p < 0.088). La prevalencia de RI en sujetos con SM por criterio IDF fue 43%.
Conclusiones: Los nuevos puntos de corte para la CC en nuestra población fueron 94.5/89.5 cm para vaones/mujeres. Para varones los puntos de corte fueron más bajos que los definidos por criterio ATPIII, pero similar a los propuestos por criterio IDF. Para mujeres los puntos de corte fueron más elevados que los propuestos por criterios ATPIII/IDF.

Introduction

Obesity is a major Public Health epidemic problem worldwide, both in adults and children.[1] Obesity and overweight have been associated with an increased risk of diseases such as diabetes, heart disease, arthritis, and cancer.[2–4] Furthermore, obesity, particularly abdominal type (AO), is associated with increased morbidity and mortality.[5]

The metabolic syndrome (MS) is considered to be a clustering of metabolic and non-metabolic risk factors that increase the risk for developing type 2 diabetes mellitus.[6]

In 2001, the National Cholesterol Education Program (ATPIII) Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Expert Panel on Detection, Evaluation, and Treatment Panel III 2001)[7] introduced a new definition for MS. One of the criteria of this definition, (fasting glucose $\geq$ 100 mg/dl), was modified in 2004.[8]

In 2005, the International Diabetes Federation (IDF) proposed a new definition[9] in which the presence of AO was considered essential and the role of ethnicity in the relation of AO to other metabolic risk factors is taken into account. Many studies have indicated that AO[10,11] and IR[12] are major underlying mechanisms for MS.

Moreover, the new IDF definition requires ethnic specific cut-off points values for waist circumference (WC) ($\geq$94 and $\geq$80 cm for European men and women, respectively).

In 2009, a Joint Interim report[13] by the IDF Task Force on Epidemiology and Prevention in collaboration with other expert Committees of the National Heart, Lung, and Blood Institute; American Heart Association; World Heart Federation; International Atherosclerosis Society; and International Association for the Study of Obesity declared that obesity should not be an obligatory component, but that ''national or regional cut-off points for WC can be used''.Overall, those reported values for waist circumference are very variable in different geographical areas in Spain.[14,15] Due to the disparity of WC values in Spain, we decided to search for WC cut-off point values for our population through an extensive multicentre nationwide Spanish population based study in our country to detect IR and MS.

Design, population

We studied 4097 subjects from the general population of Spain. Details of recruitment and study protocols of this population-based survey were previously described.[16,17] In brief, all men and non-pregnant women aged 35–74 years were invited to participate. Two hundred and fifty-four subjects were excluded, because they met one or more of the following exclusion criteria: type 1 diabetes, overt heart or hepatic failure, surgery during the previous year, weight changes >5 kg within the previous 6 months, and hospitalization. A total of 3844 subjects completed the study, 1754 males and 2090 females. We used standard procedures adapted from the WHO MONICA protocol,[18] which was approved by the Institutional Review Board. All participants gave written informed consent.

Interviewers trained to obtain the following data administered a medical questionnaire: age, sex, parity,