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ORIGINAL ARTICLE

Relationship between vitamin D deficiency and metabolic syndrome in adult population of the Community of Madrid☆

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KEYWORDS
Vitamin D;
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Abstract
Backgrounds and objective: Previous studies have suggested an association between MS and vitamin D deficiency, but data are not conclusive. This study was intended to find out if metabolic syndrome, according to the 2009 IDF/AHA/NHLBI, is associated to the presence of vitamin D deficiency.
Material and methods: A cross-sectional study was conducted on a sample of 326 subjects aged 18 years or older, recruited from a health center in Alcalá de Henares. Participants underwent an interview and a standardized clinical examination. In a second visit, blood tests were performed in 255 subjects to quantify serum levels of 25-hydroxyvitamin D (25 OH-VitD) and different laboratory parameters associated to MS. The association between vitamin D deficiency and metabolic syndrome (and each of its components) was examined.
Results: In the study population, MS prevalence was 36.1% and prevalence of vitamin D deficiency (25 OH-Vit D < 20 ng/mL) was 56.3%. MS was more common in the group of patients with vitamin D deficiency (43.4%) than in the group with no deficiency (26.8%, $P = 0.006$), with an estimated prevalence ratio of 1.62 (95% CI: 1.13–2.31). Adjustment for age, sex, and body mass index did not change such association.

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Conclusions: There is a significant association between vitamin D deficiency and MS. Both conditions are highly prevalent in our population.

PALABRAS CLAVE
Vitamina D;
Síndrome metabólico;
Diabetes tipo 2

Relación entre el déficit de vitamina D y el síndrome metabólico en población adulta de la Comunidad de Madrid

Resumen
Antecedentes y objetivo: Estudios previos han sugerido una asociación entre síndrome metabólico (SM) y el déficit de vitamina D, si bien estos datos no son concluyentes. Este estudio pretende conocer si la presencia de SM, según criterios de IDF/AHA/NHLBI de 2009, se asocia con la presencia de déficit de vitamina D.
Material y métodos: Se realizó un estudio de corte transversal en el que se incluyeron inicialmente 326 individuos >18 años, seleccionados de un centro de salud de Alcalá de Henares. A los participantes se les hizo una entrevista y un examen clínico estandarizado y, finalmente, en una segunda visita, a 255 sujetos se les realizó un análisis de sangre para cuantificar las concentraciones séricas de 25 hidroxivitamina D (25 OH-VitD) y diferentes parámetros analíticos asociados al SM. Se analizó la asociación entre el déficit de la vitamina D y el SM (y cada uno de sus distintos componentes).
Resultados: En la población de estudio la prevalencia de SM fue del 36,1% y del déficit de vitamina D, 25 OH-VitD < 20 ng/ml, del 56,3%. El SM fue más frecuente en el grupo de pacientes con déficit de vitamina D, 43,4%, respecto al grupo sin déficit, 26,8% (p = 0,006), siendo la razón de prevalencia de SM de 1,62 (IC 95%: 1,13–2,31). Esta asociación se mantuvo tras el ajuste por edad, sexo e índice de masa corporal.
Conclusiones: Existe una asociación significativa entre el déficit de vitamina D y el SM, situaciones clínicas de elevada prevalencia en nuestra población.

Introduction

Metabolic syndrome (MS) and its consequences have become an increasing health problem in the 21st century. MS is a clinical condition defined by the occurrence of a number of metabolic and vascular changes: central obesity, high blood pressure, dyslipidemia, hyperglycemia, insulin resistance, and a prothrombotic state. The main effect of these changes is an increased risk of cardiovascular disease and type 2 diabetes mellitus, but they have also been associated with non-alcoholic liver disease, gout, and sleep apnea, among others.[1] Abdominal obesity, one of the components of MS, has also been recently associated with an increased overall risk of cancer.[2] Insulin resistance (IR) is the hypothesis most widely accepted to explain the etiopathogenesis of MS.[1]

However, the diagnosis of MS, and even its very existence, is controversial, particularly because diagnostic criteria of the syndrome have changed over time. This has made it very difficult to compile data regarding its prevalence. The main scientific bodies involved in MS management (IDF/AHA/NHLBI) recently reached a consensus that harmonizes the different diagnostic criteria currently available.[3]

On the other hand, the effects of vitamin D on bone health and the maintenance of phosphate and calcium metabolism have been widely studied and are well known today. Many other actions of vitamin D in the body have been discovered in recent years. These other extraskeletal actions are due, among other factors, to the ubiquity of the vitamin D receptor and enzymes that hydroxylate vitamin D, and also to the different regulation of this production depending on the tissue where they are expressed, which causes vitamin D, as hormone, to have not only endocrine functions, but also autocrine and paracrine functions.[4,5]

The cause of MS is unknown, and although some predisposing genetic and environmental factors have been identified, in recent years it has been proposed that vitamin D deficiency could be one of these factors. Various cross-sectional studies have supported this theory of a relationship between the presence of metabolic syndrome and vitamin D deficiency.[6–9] However, few prospective observational studies[10–12] and interventional studies[13,14] showing this relationship are available.

The purpose of this study was to ascertain whether the presence of MS, according to the harmonized criteria of IDF/AHA/NHLBI, is associated with the presence of vitamin D deficiency, and to ascertain whether an association exists between vitamin D deficiency and any of the components of MS.

Material and methods

Study description and design

This was an observational, cross-sectional study that analyzed a sample of 326 subjects of both sexes over 18 years of age selected from primary care clinics of the Luis Vives healthcare center in Alcalá de Henares (Madrid, Spain). Both