



MEDICINA CLINICA

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Original article

Stress, anger and Mediterranean diet as predictors of metabolic syndrome[☆]

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ARTICLE INFO

Article history:

Received 31 May 2017

Accepted 6 August 2017

Available online xxx

Keywords:

Metabolic syndrome

Psychological stress

Anger

Mediterranean diet

Quality of life

ABSTRACT

Background and objective: Metabolic syndrome (MetS) is a cluster of metabolic conditions that include abdominal obesity, reduction in cholesterol concentrations linked to high density lipoproteins (HDLc), elevated triglycerides, increased blood pressure and hyperglycaemia. Given that this is a multicausal disease, the aim of this study is to identify the psychological, emotional and lifestyle variables that can have an influence on the different MetS components.

Patients and methods: A cross-sectional study with 103 patients with diagnostic criteria for MetS (47 male and 56 female). Anthropometric, clinical and analytical measurements were collected to assess the variables associated with MetS. The main psychological and emotional variables were also assessed.

Results: Different multiple linear regression tests were performed to identify which variables were predictive of MetS. The dependent variables were body mass index (BMI), abdominal circumference, HDLc, and quality of life, and the predictive variables were psychological stress, anger and adherence to a Mediterranean diet. The results showed that psychological stress was a predictor of quality of life ($\beta = -0.55$, $p \leq 0$). Similarly, anger was a predictor of BMI ($\beta = 0.23$, $p = .047$) and abdominal circumference ($\beta = 0.27$, $p = .021$). As expected, adherence to a Mediterranean diet was a predictor of HDLc ($\beta = 0.2$, $p = .045$) and of quality of life ($\beta = -0.18$, $p = .031$).

Conclusions: The results confirm a link between adherence to certain dietary habits and lifestyle, however they go one step further and show the importance of psychological and emotional factors like psychological stress and anger in some MetS components.

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Estrés, ira y dieta mediterránea como factores predictores del síndrome metabólico

RESUMEN

Antecedentes y objetivo: El síndrome metabólico (SM) es un conjunto de condiciones metabólicas que incluyen obesidad abdominal, reducción de las concentraciones de colesterol unido a las *high density lipoproteins* (c-HDL, «lipoproteínas de alta densidad»), triglicéridos elevados, aumento de la presión arterial e hiperglucemia. Dado que se trata de una enfermedad multicausal, el objetivo de este estudio es identificar las variables psicológicas, emocionales y de estilo de vida que pueden ejercer una influencia sobre los diferentes componentes del SM.

Pacientes y métodos: Estudio transversal con 103 pacientes diagnosticados de SM (47 varones y 56 mujeres). Se recogieron medidas antropométricas, clínicas y analíticas para valorar las variables asociadas al SM. También se evaluaron las principales variables psicológicas y emocionales.

Palabras clave:

Síndrome metabólico

Estrés psicológico

Ira

Dieta mediterránea

Calidad de vida

[☆] Please cite this article as: Garcia-Silva J, Navarrete Navarrete N, Ruano Rodríguez A, Peralta-Ramírez MI, Mediavilla García JD, Caballo VE. Estrés, ira y dieta mediterránea como factores predictores del síndrome metabólico. Med Clin (Barc). 2018. <https://doi.org/10.1016/j.medcli.2017.08.012>

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Resultados: Se realizaron diferentes pruebas de regresión lineal múltiple para identificar qué variables eran predictoras del SM. Las variables dependientes fueron el índice de masa corporal (IMC), la circunferencia abdominal, el c-HDL y la calidad de vida, y las variables predictoras fueron el estrés psicológico, la ira y la adherencia a la dieta mediterránea. Los resultados mostraron que el estrés psicológico era un predictor de la calidad de vida ($\beta = -0,55$, $p \leq 0$). De igual modo, la ira fue un predictor del IMC ($\beta = 0,23$, $p = 0,047$) y de la circunferencia abdominal ($\beta = 0,27$, $p = 0,021$). Según lo previsto, la adherencia a la dieta mediterránea fue un predictor del c-HDL ($\beta = 0,2$, $p = 0,045$) y de la calidad de vida ($\beta = -0,18$, $p = 0,031$).

Conclusiones: Los resultados confirman un vínculo entre la adherencia a ciertos hábitos alimentarios y el estilo de vida; sin embargo, se sitúan un paso por delante y resaltan la importancia de los factores psicológicos y emocionales como el estrés y la ira en algunos componentes del SM.

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Introduction

The metabolic syndrome (MetS) is a set of metabolic disorders consisting of central distribution obesity, dyslipidemia, increased blood pressure (BP) and hyperglycemia, insulin resistance being the link between such disorders.¹

Regarding lifestyle, there is evidence showing that factors such smoking and alcohol consumption, sedentary lifestyle and diet high in fat are closely related to cardiovascular diseases (CVDs).² Diet is the lifestyle related factor with the greatest impact, considering that healthy living habits and strict adherence to the Mediterranean diet (MedDiet) have been associated with a lower risk of CVD.³

Although the etiopathogenesis of MetS is not exactly known, in addition to the genetic and lifestyle factors it is known that there are different psychological and emotional factors related to the lifestyle that, on a genetically predisposed individual, can favor the appearance of MetS,² but so far, these conclusions are unclear.

As for the role of emotions, it has been found that the expression of anger and hostility were positively associated with an increase in fasting glucose, glycosylated hemoglobin, inversely with HDLc, and with an increased risk of myocardial infarction in patients with MetS.⁴ The results published by other authors point to differences between genders. Elovainio et al.⁵ found associations of hostility with low educational level, higher alcohol consumption, more smoking and an increase in BP in both sexes, as well as lower physical activity and an increased risk of developing MetS in women. And, in another study, among women, life satisfaction was inversely associated with triglyceride levels, LDL-C, and risk of hypertriglyceridemia, reduced HDLc and MetS.⁶ An association was also identified between hostility and TG levels. Among men, hostility was associated with fasting plasma insulin.⁶ We find it relevant to highlight the role of anger and hostility in MetS, as opposed to factors classically known as lifestyle habits, diet and psychological stress.

As for psychological stress, its relationship with MetS has been studied more widely, and there is evidence that daily stress is associated with the development of MetS and CVDs.⁷ Specifically, weight gain with conjugal dissatisfaction, perceived stress and distress; dyslipidemia with psychosocial stress; diabetes Mellitus type II (DM-II) with perceived stress and distress in men; and hypertension with marital stress and perceived stress.⁷ It has also been shown that chronic stress is associated with metabolic diseases and insulin resistance; and with obesity and triglycerides in patients with MetS.^{8,9} However, despite the known implications of psychological variables such as anger or stress in cardiovascular and metabolic diseases, it is necessary to investigate how these variables affect each of the MetS components.¹⁰ Therefore, the objective of this study has been to identify what psychological, emotional and life habits variables predict the different MetS components in our study population, and check if there are differences attributable to gender.

Patients and methods

Participants

The study inclusion criteria were men and women aged 25–65 years with waist circumference (WC) >88 cm for women and >102 cm for men and two or more of the following characteristics: blood pressure: systolic ≥ 130 mmHg and diastolic ≥ 85 mmHg; fasting glucose level ≥ 110 mg/dL; triglycerides: ≥ 150 mg/dL; HDL cholesterol ≤ 40 mg/dL in men and ≤ 50 mg/dL in women.¹ Exclusion criteria were severe osteoarthritis, active inflammatory diseases, severe psychiatric disorders and/or presence of significant cognitive impairment assessed through the Mini-Mental State Examination.

A total of 103 subjects had MetS criteria's, 56 were women (54%) with a mean age of 55.95 years (SD = 7.78) and 47 men (45.6%) with a mean age of 54.11 years (SD = 8.11).

The subjects were recruited at the University Hospital Virgen de las Nieves (HUVN) in Granada (Spain), from 2013 to 2014. **Table 1** describes the demographic characteristics of the study population. All subjects included, after reading the study information sheet, signed the informed consent elaborated according to the recommendations of the Declaration of Helsinki. The research protocol was approved by the Ethical Committee of the HUVN.

Table 1

Descriptive statistics that describe the profile of the sample, taking into account age, level of education, economic and employment status, possible comorbidities, dietary habits and physical exercise.

Variables	% (n = 103)
Education	
Primary	24.3 (25)
Secondary	9.7 (10)
General Certificate of Education (A-Level)	13.6 (14)
Vocational Training	22.3 (23)
Diploma of Higher Education/University Degree	19.4 (20)
Economic status	
High	12.6 (13)
Middle	50.5 (52)
Low	36.9 (38)
Physical activity	
Active	64.1 (66)
Inactive	35.9 (37)
Diet	
Satisfactory	30.1 (31)
Requires change	69.9 (72)
Comorbidities	
Osteoarthritis/polyosteoarthritis	13.6 (14)
Gout	4.9 (5)
Other diseases	6.8 (7)

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