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The pulse-mass index as a predictor of cardiovascular events in women with systemic lupus erythematosus☆

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ABSTRACT

Background: Patients with systemic lupus erythematosus (SLE) have 3 times the risk of death compared to the rest of the population, with cardiovascular events (CVD) being one of the main causes. Indices such as waist-height (W-Ht I), waist-hip (W-Hp I) and pulse-mass (PMI) predict CVD, though the behaviour is unknown in patients with SLE. The aim of this study was to determine the prognostic value of PMI in the development of CVD in premenopausal women with SLE.
Methodology: Cohort study. Included were premenopausal women with SLE without prior CVD; excluded were those patients with antiphospholipid syndrome (APS), pregnancy, thyroid disease, recent liposuction, and chronic kidney disease. Exposure variables were: PMI, W-Ht I, W-Hp I and metabolic syndrome at onset of the cohort. Considered confounding variables were time of evolution, disease activity, cumulative damage and treatment. Through semi-annual appointments, accident and emergency admittance and hospitalization records the CVD were screened. Analysis was performed with Cox for proportional hazards and survival with Kaplan Meier.
Results: We included 238 women with a median age of 31 (18–52) years, with a follow-up of 8 years. We identified 22 (9.6%) cases of CVD. In the Cox proportional hazards analysis, the prognostic variables were: PMI with HR = 8.1 (95% CI: 1.1–65), metabolic syndrome with 2.4 (95% CI: 1–5.8), cumulative damage with HR = 1.5 (95% CI: 1.1–2.2) and body fat percentage HR = 2.8 (95% CI: 1.1–6.9).
Conclusions: The PMI is a better predictor factor of CVD in women with SLE.

El índice pulso-masa como factor pronóstico de eventos cardiovasculares en mujeres con lupus eritematoso sistémico

Palabras clave:
Lupus eritematoso sistémico
Enfermedad cardiovascular
Factores de riesgo tradicionales
Síndrome metabólico
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Índice pulso masa

RESUMEN

Antecedentes: Los enfermos de lupus eritematoso generalizado (LEG), comparados con el resto de la población, tienen 3 veces más riesgo de muerte; los eventos cardiovasculares (ECV) son una de las principales causas. Existen índices como cintura-talla (ICT), cintura-cadera (ICC) y el pulso-masa (IPM) que pronostican ECV; su comportamiento se desconoce en el LEG. El objetivo de este estudio fue determinar el valour pronóstico del IPM en el desarrollo de ECV en mujeres premenopáusicas con LEG.
Metodología: Estudio de cohorte. Se incluyó a mujeres premenopáusicas con LEG, sin ECV previo; se excluyó a las pacientes que presentaran síndrome antifosfolípido (SAF), que estuvieran embarazadas, con enfermedad tiroidea, liposucción reciente y enfermedad renal crónica.

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Las variables de exposición fueron: IPM, ICT, ICC y síndrome metabólico al momento del ingreso a la cohorte. Se consideraron como variables confusoras el tiempo de evolución, actividad de la enfermedad, daño acumulado y tratamiento. Por medio de citas semestrales, registro de urgencias y hospitalización, se midieron los ECV.

Se utilizó análisis de riesgos proporcionales de Cox y sobrevida por Kaplan–Meier.

Resultados: Se incluyó a 238 mujeres con mediana de edad de 31 años (18-52), con seguimiento de 8 años. Se presentaron 22 casos (9,6%) de ECV. En el análisis de regresión de Cox las variables pronósticas fueron: IPM con HR = 8,1 (IC95%: 1,1-65), síndrome metabólico con 2,4 (IC95%: 1-5,8), daño acumulado con HR = 1,5 (IC95%: 1,1-2,2) y porcentaje de grasa corporal con HR = 2,8 (IC95%: 1,1-6,9).

Conclusiones: El IPM es un buen factor pronóstico de ECV en mujeres con LEG.

Introduction

Mortality in patients with systemic lupus erythematosus (SLE) is 3 times greater than in the rest of the population.[1] One of the main causes is cardiovascular events (CVE)[2]; and its frequency varies according to cohorts, between 8 and 15%.[3,4]

Traditional cardiovascular risk factors have a higher prevalence,[5] although its prognostic effect is lower when compared to other variables such as male sex, disease activity, cumulative damage, neurological damage or the presence of autoantibodies.[6,7]

The best predictor is one that is quickly accessible, has a lower cost and it is easy to measure; and in the case of CVE, it is known that a body mass index (BMI) greater than 25 kg/m^2 and metabolic syndrome (MS) represent an even higher risk than traditional factors in women with SLE.[8] There are other ratios such as waist-to-height ratio (WHtR) or waist-to-hip ratio (WHR) evaluating the effect of abdominal obesity in the development of atheromatous disease in people without rheumatic diseases.[9]

In the Framingham cohort, pulse-mass index (PMI) was described as a possible factor in predicting CVE, based on the relationship between body mass index (BMI) and pulse, which indirectly reflects the sympathetic effect.[10] There are no studies linking anthropometric ratios with PMI in SLE population.

The aim of this study was to determine the prognostic value of PMI in the development of CVE in premenopausal women with SLE.

Methodology

After approval by the Local Clinical Research Ethics Committee, a closed cohort study[11] was conducted, from 2001 to 2008, in women with SLE at the Salvador Zubiran National Institute of Medical Sciences and Nutrition in Mexico City. It included women aged ≥18 years, premenopausal, with the SLE classification criteria (≥4 criteria of the American College of Rheumatology),[12] no history of CVE and who signed the informed consent; women who were pregnant, with uncontrolled thyroid disease, with limb amputation, generalized oedema, recent liposuction (<1 year) and antiphospholipid syndrome were excluded.

The cohort baseline was established in 2001, when the selection criteria were met.

Acute myocardial infarction (chest pain with ST segment elevation and positive cardiac enzymes), cerebrovascular event (confirmed by angiography or MRI), pulmonary embolism (confirmed by angiography, pulmonary scintigraphy or cardiac catheterization), retinal venous or arterial thrombosis (by retinal tomography) and of lower limb arterial or venous thrombosis (by Doppler ultrasound or angiography) was considered as CVE; and its presence was determined from the clinical record, semiannual visits to the Rheumatology Department and emergency room admissions or hospitalization by treating physicians who were not involved in the research.

The prognostic variables studied were measured at the cohort's baseline, during a consultation with the doctor and licensed nutritionists, independent from routine monitoring. These were obesity (BMI > 30 kg/m^2), presence of MS, PMI (>1), WHtR (>0.50), WHR (≥0,8) and percentage of body fat.

The anthropometric assessment was performed using a standardized procedure which involved techniques described by Lohman.[13] BMI, WHtR and WHR were calculated from the results.[14]

PMI was calculated with the following formula: [(pulse × BMI)/1.730], and risk was considered when they presented a value > of 1.[10] Pulse oximetry was used to measure the heart rate, with the patient at rest at least during 1 h, in the absence of fever or disease-modifying drugs.

The presence of MS was classified during the cohort formation year using the CONSENSUS *definition* of 2009[15], and was defined by the presence of three or more of the following abnormalities: abdominal obesity (waist circumference >84 cm for Mexican women), triglycerides ≥150 mg/dL or medical treatment, HDL cholesterol <50 mg/dL, blood pressure ≥130/≥85 mmHg and fasting glucose ≥100 mg/dL. Patients under dyslipidaemia control treatments or under antihypertensive therapy were also considered positive. For the adjustment of the hyperglycaemia variable, apart from a history of hypoglycaemic agents, insulin resistance was measured by calculating HOMA (insulin resistance homeostasis model assessment) and the result was considered positive when >2.5.[16]

A baseline assessment was conducted in 2001, and clinical variables such as clinical manifestations, confirmation of diagnosis, disease progression at the time of inclusion in the study, medical treatment, traditional risk factors for cardiovascular events, disease clinical activity (MEX-SLEDAI), cumulative damage of the disease (SLICC/ACR index), presence of Cushing's syndrome, blood pressure and heart rate were recorded. Biochemical variables such as glucose, lipid profile and insulin were determined; dietary variables such as total consumption of kilocalories per day and distribution of carbohydrates, proteins and lipids, and anthropometric variables such as weight, height, body fat percentage and waist circumference, in addition, levels of anticardiolipin antibodies and β2 glycoprotein were determined.

Follow-up was carried out during 7 years. Losses to follow-up were recorded. These were due to healthcare unit change, change of address or death.

The development of the database and subsequent analysis was performed by people who were totally independent from the healthcare process or the information collection process.

Statistical analysis

Descriptive statistics were performed using the median and interquartile range (for continuous variables). The nonparametric Mann–Whitney test was used to compare the continuous variables of 2 independent groups, and the X^2 test or Fisher's exact test