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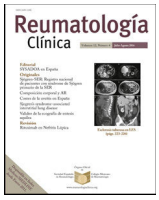

Original article

Cardiovascular disease in patients with systemic autoimmune diseases: The relationship between self-perceived risk and actual risk

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ABSTRACT

Introduction: Autoimmune diseases are known to be associated with an elevated risk of cardiovascular diseases; however, there exists a lack of awareness regarding this increased risk among patients.
Objective: This study aimed to assess the prevalence of cardiovascular risk factors and events in various systemic autoimmune diseases, including Systemic Sclerosis (SSc), Systemic Lupus Erythematosus (SLE), Rheumatoid Arthritis (RA), and Sjögren's syndrome (SS), matched by age, sex, and disease duration. Additionally, the study aimed to evaluate the perceived and actual risks of cardiovascular disease among patients.
Methods: A cross-sectional self-reported survey on the patient's perspective of cardiovascular risk was conducted between January and June 2023. Sociodemographic and clinical data, including disease activity, were collected through medical records and questionnaires. Traditional cardiovascular risk factors and events were assessed, alongside the perceived cardiovascular risk. The SCORE calculation and Charlson Comorbidity Index (CCI) were employed for cardiovascular risk assessment.
Results: Survey responses from 180 patients (45 patients each with SSc, SLE, RA, and SS) with systemic autoimmune diseases revealed that 20% perceived a low risk, 23% perceived neither lower nor higher, and 56% perceived a higher risk of developing cardiovascular diseases in the next ten years. Only 45% agreed that their autoimmune disease could increase the risk of a heart attack, even in the absence of other risk factors, and 46.7% were unaware that NSAIDs pose a cardiovascular risk. An association between cardiovascular risk measured by SCORE, comorbidities, and risk perception was observed in RA, SSc, and SS patients, with no association found in SLE patients ($p = 0.27$). Except for SS patients ($p = 0.02$), no association between CCI and disease activity level was found. Regarding the influence of age, working status, and education in CVD risk perception, an association between CVD risk perception and age was observed ($p = 0.01$), with patients over 40 years exhibiting a higher perception of CVD risk. No differences were found regarding working status ($p = 0.19$) nor education level ($p = 0.06$).
Conclusions: Patients with SS, RA, and SSc displayed a heightened perception of cardiovascular risk, correlating with their actual risk and preexisting comorbidities. However, patients exhibited unawareness of certain cardiovascular risk behaviors. This underscores the need for tailored education programs on cardiovascular risk for autoimmune disease patients, to be implemented at the time of diagnosis and during follow-up in outpatient clinics.

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Enfermedad cardiovascular en pacientes con enfermedades autoinmunes sistémicas: la relación entre el riesgo autopercibido y el riesgo real

Palabras clave:
Cardiovascular
Enfermedades autoinmunes
Percepción de riesgo

R E S U M E N

Introducción: Las enfermedades autoinmunes sistémicas asocian un mayor riesgo de enfermedades cardiovasculares. A pesar de esto, existe una falta de percepción de ese riesgo por los pacientes.
Objetivo: Este estudio tuvo como objetivo evaluar la prevalencia de factores y eventos de riesgo cardiovascular en diferentes enfermedades autoinmunes sistémicas, incluyendo esclerosis sistémica (SSc), lupus eritematoso sistémico (SLE), artritis reumatoide (RA) y síndrome de Sjögren (SS), emparejadas por edad, sexo y duración de la enfermedad. Además, el estudio buscó evaluar los riesgos percibidos y reales de enfermedades cardiovasculares entre los pacientes.
Métodos: Se llevó a cabo una encuesta transversal sobre la perspectiva del paciente sobre el riesgo cardiovascular entre enero y junio de 2023. Se recopilaron datos sociodemográficos y clínicos, incluida la actividad de la enfermedad, a través de registros médicos y cuestionarios. Se evaluaron factores y eventos tradicionales de riesgo cardiovascular, junto con el riesgo cardiovascular percibido. Se empleó el índice SCORE y el Índice de Comorbilidad de Charlson (CCI) para la evaluación del riesgo cardiovascular.
Resultados: Las respuestas de la encuesta de 180 pacientes (45 pacientes con SSc, SLE, RA y SS cada uno) con enfermedades autoinmunes sistémicas revelaron que el 20% percibía un riesgo bajo, el 23% no percibía un riesgo bajo ni alto, y el 56% percibía un riesgo más alto de desarrollar enfermedades cardiovasculares en los próximos diez años. Solo el 45% estuvo de acuerdo en que su enfermedad autoinmune podría aumentar el riesgo de infarto, incluso en ausencia de otros factores de riesgo, y el 46,7% no sabía que los AINE se asocian a un aumento de riesgo cardiovascular. Se observó una asociación entre el riesgo cardiovascular medido por SCORE, las comorbilidades y la percepción del riesgo en pacientes con RA, SSc y SS, aunque no se encontró asociación en pacientes con SLE ($p = 0,27$). Excepto para los pacientes con SS ($p = 0,02$), no se encontró asociación entre el CCI y el nivel de actividad de la enfermedad. Al analizar la influencia de la edad, la situación laboral y la educación en la percepción del riesgo cardiovascular, se observó una asociación entre la percepción del riesgo cardiovascular y la edad ($p = 0,01$), los pacientes mayores de 40 años demostraron una mayor percepción del riesgo. Sin embargo, no se encontraron diferencias con respecto a la situación laboral ($p = 0,19$) ni al nivel educativo ($p = 0,06$).
Conclusiones: Los pacientes con SS, RA y SSc mostraron una percepción elevada de su riesgo cardiovascular, que se asoció con su riesgo real y comorbilidades preexistentes. Sin embargo, los pacientes mostraron falta de conocimiento sobre ciertos comportamientos de riesgo cardiovascular. Esto subraya la necesidad de programas de educación adaptados sobre el riesgo cardiovascular para pacientes con enfermedades autoinmunes, que deben implementarse en el momento del diagnóstico y durante el seguimiento en las clínicas.

Introduction

Cardiovascular diseases (CVDs) encompass a range of conditions and represent a burgeoning global health challenge, standing as the leading cause of mortality.[1] Atherosclerosis, primarily driven by both nonmodifiable factors like age and sex, and modifiable elements, including traditional and nontraditional cardiovascular risk factors, constitutes the predominant cause of CVD. Modifiable risk factors contribute to over 70% of global CVD cases.[2]

Immune-mediated inflammatory diseases (IMIDs) such as Rheumatoid Arthritis, Systemic Sclerosis, Sjögren's Syndrome, and Systemic Lupus Erythematosus, exhibit elevated rates of cardiovascular morbidity and mortality.[3] Numerous studies have disclosed a heightened prevalence of well-established cardiovascular risk factors—metabolic syndrome, smoking, type 2 diabetes, and obesity—in IMID patients.[4] Treatment with glucocorticoids and non-steroidal anti-inflammatory drugs, often employed to manage inflammation in IMIDs, has been strongly linked to an increased likelihood of CVD risk.[5] The interplay of these risk factors with chronic inflammation and immune dysregulation in IMIDs further amplifies cardiovascular morbidity and mortality rates.

Recognizing the cardiovascular risk linked to systemic autoimmune diseases and assessing patients' perceived risk of CVD is crucial for formulating effective screening protocols to identify at-risk patients early on, potentially enhancing long-term prognoses through prompt intervention.[6] Patient risk perception may influence the adoption of health-protective behaviors, thereby impacting prognosis and quality of life. Factors such as age at diagnosis, disease activity, and comorbidity presence could potentially influence patients' perception of cardiovascular risk.

Numerous studies underscore the impact of modifying risk factors on the quality of life for patients at high risk of cardiovascular events, with some revealing a lower perception of cardiovascular risk factors and associated risks. These findings have prompted the identification of modifiable CVD risk factors to mitigate these medical conditions.[7] Patients can effectively prevent CVDs by making long-term lifestyle changes, dispelling false beliefs about their conditions, and being aware of their cardiovascular risk. Adherence to secondary preventive measures by patients may reduce the risk of cardiovascular disease progression and expedite recovery progress.

In light of these considerations, we have conducted a study to assess the prevalence of cardiovascular risk factors and events among different systemic autoimmune diseases (Rheumatoid Arthritis: RA, Systemic Sclerosis: SSc, Sjogren's Syndrome: SS, and Systemic Lupus Erythematosus: SLE) and assess the relationship between perceived and actual risk. Additionally, our aim was to understand the relationship between the Charlson Comorbidity Index, disease activity index, and perceived cardiovascular risk.

Methods

Patients

A cross-sectional study including a 180 sample of patients followed up in a Rheumatology outpatient clinic from Complejo Asistencial Universitario de León with the following diagnosis: Systemic Lupus Erythematosus (SLE), Sjogren's Syndrome (SS), Systemic Sclerosis (SSc) and Rheumatoid Arthritis (RA) fulfilling ACR/EULAR criteria matched by age, sex and disease duration were included. The inclusion criteria were: age over 18 years old and ≥5-year follow-up at the consultation. Patients who did not meet the criteria for a defined disease and overlap syndromes, deaths, and loss of follow-up were excluded.

Data collection

Sociodemographic data, clinical data and analytical parameters and disease activity score at inclusion were included after reviewing medical records. A standard protocol of questionnaires, completed after a clinical interview with closed questions were performed. The items on the questionnaires were common to all diseases (including those regarding demographic data, traditional cardiovascular risk factors, and cardiovascular events). Traditional cardiovascular risk and cardiovascular events history were also collected.

Definition of traditional cardiovascular risk

Cardiovascular risk factors were established using the following World Health Organization (WHO) definitions[8]:

- **Arterial hypertension:** systolic blood pressure (SBP) over 140 mmHg or diastolic blood pressure (DBP) over 90 mmHg or receiving antihypertensive treatment. Blood pressure was considered as the mean of 3 measurements.
- **Dyslipidemia:** cholesterol, low-density lipoprotein, (LDL), triglycerides, and high-density lipoprotein (HDL) imbalance. **Hypercholesterolemia** as total cholesterol level > 250 mg/dl on two or more prospective occasions. **Hypertriglyceridemia** as serum triglyceride level > 150 mg/dl on two or more prospective occasions. **Abnormal high-density lipoprotein (HDL)** as <40 mg/dl) and **abnormal low-density lipoprotein** (LDL); defined as >130 mg/dl).
- **Obesity** was defined as body mass index (BMI) over 30 kg/m^2.
- **Smoking** was defined as current smoker and ex-smoker.
- **Diabetes mellitus** was defined as diabetes requiring insulin/oral antidiabetic drugs treatment and/or the presence in at least two determinations of fasting glycemia higher than 126 mg/dl.
- **Hyperuricemia** was defined as serum uric acid concentrations over 6 mg/dl for females, 7 mg/dl for men or patients under uric acid lowering drugs treatment.

Definition of cardiovascular events

Cardiovascular events were evaluated retrospectively and included:

- **Cerebrovascular disease** including ischemic attacks confirmed by brain CT and/or brain MRI and carotid artery disease on sonography.
- **Coronary artery disease** included heart infarction defined by elevated cardiac enzyme levels and/or electrocardiogram; silent myocardial ischemia defined as myocardial ischemia in the absence of chest discomfort or other anginal equivalents; stable angina and unstable angina defined clinically during physical exertion.
- **Arrhythmia:** including supraventricular arrhythmias, ventricular tachyarrhythmias and ventricular fibrillation, atrial fibrillation, and bradyarrhythmia.
- **Conduction defects:** first-degree heart block, left anterior fascicular block, right and left, bundle branch block, and second- or third-degree AV block.
- **Arterial peripheral vascular disease:** narrowing or blockage of the vessels that carry blood from the heart to the legs.
- **Venous thrombosis:** deep vein thrombosis and pulmonary embolism.
- **Heart failure:** structural and/or functional cardiac abnormality and corroborated by elevated natriuretic peptide levels and/or objective evidence of pulmonary or systemic congestion.
- **Valvular heart disease:** the presence of stenosis and insufficiency/regurgitation involving the valves of the heart demonstrated by echocardiography.

Cardiovascular risk assessment

According to the 2016 European Society of Cardiology guidelines, CV risk assessment was performed using the SCORE calculation. The SCORE is a simple, office-based screening tool that predicts the probability of developing CVD in the next 10 years based on sex, age, systolic blood pressure, smoking status, and the ratio of total cholesterol (TC)/high-density lipoprotein cholesterol (HDL-C). Subjects were classified as low risk (SCORE < 1%), moderate risk (1% to <5%), high risk (5% to <10%), or very high risk (those with established CVD or diabetes and SCORE ≥ 10%) for future CVD.[9]

Charlson Comorbidity Index

The Charlson Comorbidity Index (CCI) assesses the presence of comorbidities by taking into account both the number and severity of pre-defined comorbid conditions: myocardial infarct, congestive heart failure, peripheral vascular disease, cerebrovascular disease, dementia, chronic pulmonary disease, connective tissue disease, peptic ulcer disease, mild liver disease, diabetes, hemiplegia, moderate or severe renal disease, diabetes with end organ damage, any tumor, leukemia, lymphoma, moderate or severe liver disease, metastatic solid tumor, AIDS. It can be used to predict short-term and long-term outcomes such as function, hospital length of stay and mortality rates. Based on the CCI score, the severity of comorbidity was categorized into three grades: mild, with CCI scores of 1–2; moderate, with CCI scores of 3–4; and severe, with CCI scores ≥ 5.[10]

Disease activity indexes

Disease activity was assessed in SLE, RA, SS and SSc at the time of inclusion in the study. SLEDAI (Systemic Lupus Erythematosus Disease activity index) was used for SLE, ESSDAI (EULAR Sjögren's syndrome (SS) disease activity index) for SS, DAS28 (Disease Activity Score Calculator for Rheumatoid Arthritis) for RA and EUSTAR activity index 2017 for SSc. Disease activities were graded as low (SLEDAI: 1–5, DAS28 ≤ 3.2, ESSDAI: 1–4, EUSTAR-AI < 2.5), moderate (SLEDAI: 6–10; DAS28 > 3.2 and ≤5.1; ESSDAI: 5–13) and high (SLEDAI: ≥11; DAS28 > 5.1; ESSDAI > 13, EUSTAR-AI ≥ 2.5).[11–14]

Health risk assessment questionnaire

As part of this study, an anonymous, self-administered questionnaire was distributed to the 180 patients included in our study. The questionnaire was developed by our research group, comprising

physicians, researchers, and nurses, to assess patients' perception of cardiovascular disease (CVD) risk and evaluate various dimensions: physical activity, tobacco use, alcohol use, nutrition, activities in daily living, beliefs about their diagnosis, lifestyle changes after diagnosis, and biometric measures (blood pressure, cholesterol, blood glucose, weight). The health risk questionnaire was completed during the visit, and it is included as supplementary data.

The questionnaire was divided in three parts:

- **Part 1:** General information on survey participants including socio-demographic data, age of diagnosis, type of diagnosis, and current treatment with conventional/targeted synthetic disease-modifying antirheumatic drugs (c/tsDMARDs), biologic DMARDs (bDMARDs), and corticosteroids.
- **Part 2:** Risk assessment in daily life, including alert symptoms related to CVD risk and personal and familial history assessed with a 5-point Likert scale. Cardiovascular alert symptoms were assessed by the questions "I feel chest pain without making a physical effort," "I have trouble breathing when I move," and "I feel my pulse racing without making a physical effort."
- **Part 3:** Knowledge of traditional CVD risk factors and individual health status and perceived CVD risk, assessed with a 5-point Likert scale. Physical activity was assessed by the question: "Exercising two to three times per week is part of my routine". Lifestyle was assessed through the questions "Having a healthy lifestyle is important to me", "I avoid foods with high salt content", "I avoid foods with high sugar content", "I avoid excessive alcohol consumption" and "I avoid exposure to tobacco". Self-perceived risk was evaluated with statements like "My autoimmune disease does not increase the risk of having a heart attack if I have no other risk factors," "Since my diagnosis, I have made significant changes to my lifestyle," and "I do not make adjustments to my treatment without consulting my doctor first." Categorical risk perception was assessed with a 5-point Likert scale using the question "Compared to other people of the same age and sex as you, how do you perceive your risk of developing a CVD in the future in the next ten years?" It was collapsed into three categories: low perception (including much lower risk, slightly lower, and neither lower nor higher risk), moderate perception (slightly higher), and higher than others (moderately higher and much higher).

Statistical analysis

Numerical variables were summarized using mean and standard deviations, while categorical variables were presented as absolute and relative frequencies. The prevalence of traditional cardiovascular events and cardiovascular risk factors was calculated for each disease. The associations between SCORE and risk perception, and Charlson's morbidity index and risk perception were assessed using Spearman's rank correlation, while the relationship between Charlson's comorbidity index and disease activity was examined using a Chi-square test. All data analyses were performed using R version 4.3.0[15] and RStudio software,[16] with statistical significance determined with $\alpha = 0.05$.

Results

Participant characterization

A total of 180 patients were included in the study, with 58.9% being female. The inclusion comprised 45 patients from each disease group (SSc, RA, SLE, and SS). Clinical and sociodemographic data are presented in Table 1. The participants had a mean age of 61 years, and 51.7% were over 60 years old. The average disease duration was 11.8 years. In terms of employment, 41.1% worked in the private sector, and 40.6% had completed secondary education. The mean age for SLE patients was 57.3 ± 18.2 years, for SSc patients was 53.5 ± 21 years, for SS patients was 58.4 ± 23 years, and for RA was 55.2 ± 17 years.

Table 1
Sociodemographic and clinical data of 180 patients.

Variable	*N* (%)
Sex	
Female	106 (58.9%)
Male	74 (41.1%)
Age	
31–44 years old	16 (8.9%)
51–60 years old	50 (27.8%)
Over 60 years old	93 (51.7%)
Working status	
Retirement	70 (38.9%)
Private sector	74 (41.1%)
Public sector	36 (20%)
Education	
Primary education	20 (11.1%)
Secondary education	73 (40.6%)
Bachelor's degree	50 (27.8%)
PhD/PostDoc	1 (0.6%)
Clinical features	
Glandular involvement	70 (38.9%)
Articular involvement	142 (78.9%)
Muscle involvement	27 (15%)
Cutaneous involvement	59 (32.8%)
Lung involvement	23 (12.8%)
Gastrointestinal involvement	38 (21.2%)
Hematological involvement	29 (16.1%)
Renal involvement	9 (5%)
Central nervous system	6 (3.3%)
Peripheral nervous system	7 (3.9%)
Serositis	10 (5.6%)

Cardiovascular risk factors

The prevalence of cardiovascular risk factors in patients with SSc, SS, RA and SLE are represented in Table 2. Arterial hypertension (55%) was the most prevalent risk factor followed by dyslipidemia (37.8%) and diabetes mellitus (12.8%).

Cardiovascular events

Prevalence of cardiovascular events in patients with SSc, SS, SLE and RA are summarized in Table 3. Valvular heart disease (29%), arrhythmias (24%), and congestive heart failure (14.4%), as well as deep vein thrombosis (14.4%), were the most prevalent.

Association between comorbidity index and disease activity

72 (40%) patients had low disease activity, 86 (48%) patients had moderate activity and 22 (12%) patients had high activity. CCI score grading was mild for 87 (48.3%) patients, moderate for 57 (31.7%), and high for 36 (20%). When analyzing an association between the comorbidity index and disease activity, we found no significant association between CCI and disease activity level ($p = 0.62$). When the analysis was performed separately for each diagnosis, consistent results were obtained, except for Sjogren's syndrome, where a significant association between these comorbidity index and disease activity was found ($p = 0.02$).

Table 2
Prevalence of cardiovascular risk factors.

Systemic autoimmune disease	Arterial hypertension (%)	Diabetes mellitus (%)	Hyperuricemia (%)	Obesity (%)	Smoking (%)	Dyslipidemia (%)
RA	20 (44.4%)	4 (8.9%)	6 (13.3%)	10 (22%)	20 (44.4%)	16 (35.6%)
SSc	29 (64.4%)	9 (20.0%)	5 (11.1%)	16 (35.5%)	19 (42.2%)	22 (48.9%)
SLE	22 (48.9%)	6 (13.3%)	2 (4.4%)	13 (28.9%)	19 (42.2%)	19 (42.2%)
SS	28 (62.2%)	4 (8.9%)	4 (8.9%)	15 (33.3%)	22 (48.9%)	11 (24.4%)
All diseases	99 (55%)	23 (12.8%)	17 (9.4%)	54 (30%)	80 (44.4%)	68 (37.8%)

Table 3
Prevalence of cardiovascular events.

Systemic autoimmune disease	Cerebrovascular disease (%)	Valvular heart disease (%)	Heart ischemia (%)	PTE (%)	DVT (%)	Abdominal ischemia (%)	PVD (%)	CHF (%)	Arrhythmias (%)	Conduction defects (%)
RA	3 (6.7%)	14 (31.1%)	6 (13.3%)	2 (4.4%)	8 (17.8%)	0	6 (13.3%)	6 (13.3%)	14 (31.1%)	8 (17.8%)
SSc	7 (15.6%)	14 (31.1%)	4 (8.9%)	1 (2.2%)	5 (11.1%)	2 (4.4%)	5 (11.1%)	8 (17.8%)	9 (20%)	8 (17.8%)
SLE	4 (8.9%)	11 (24.4%)	4 (8.9%)	7 (15.6%)	5 (11.1%)	0	1 (2.2%)	5 (11.1%)	6 (13.3%)	2 (4.4%)
SS	2 (4.4%)	14 (31.1%)	4 (8.9%)	4 (8.9%)	8 (17.8%)	2 (4.4%)	2 (4.4%)	7 (15.6%)	14 (31.1%)	3 (6.7%)
All diseases	16 (8.9%)	53 (29.4%)	18 (10%)	14 (7.8%)	26 (14.4%)	4 (2.2%)	14 (7.8%)	26 (14.4%)	43 (23.9%)	21 (11.7%)

[a] PTE, pulmonary thromboembolism; DVT, deep vein thrombosis; PVD, peripheral vascular disease; CHF, congestive heart failure.

Table 4
Cardiovascular risk assessment from survey.

Question/answer	*N*, %
Having a healthy lifestyle is important to me	
Agree	164 (91.1%)
Totally agree	13 (7.2%)
Neither agree nor disagree	3 (1.7%)
Doing exercise 2–3 times per week is part of my routine	
Agree	67 (37.2%)
Totally agree	4 (2.2%)
Neither agree nor disagree	69 (38.3%)
Disagree	37 (20.6%)
Totally disagree	3 (1.7%)
I avoid food with high salt content	
Agree	120 (66.7%)
Totally agree	14 (7.8%)
Neither agree nor disagree	37 (20.6%)
Disagree	9 (5%)
I avoid food with high sugar content	
Agree	117 (65%)
Totally agree	19 (10.6%)
Neither agree nor disagree	37 (20.6%)
Disagree	7 (3.9%)
I avoid tobacco exposure	
Agree	71 (39.4%)
Totally agree	51 (28.3%)
Neither agree nor disagree	21 (11.7%)
Disagree	36 (20%)
Totally disagree	1 (0.6%)
I avoid drinking alcohol	
Agree	112 (62.2%)
Totally agree	37 (20.6%)
Nor agree nor disagree	25 (13.9%)
Disagree	6 (3.3%)
Following the recommendations of my doctor is important to me	
Agree	118 (65.6%)
Totally agree	44 (24.4%)
Neither agree nor disagree	18 (10%)

Table 5
Cardiovascular risk perception from survey.

Question/answer	*N*, %
My autoimmune disease does not increase my risk of having a heart attack if I have no other risk factors.	
Agree	15 (8.3%)
Neither agree nor disagree	84 (46.7%)
Disagree	78 (43.3%)
Totally disagree	3 (1.7%)
Since my diagnosis, I have made significant changes to my lifestyle.	
Agree	96 (53.3%)
Totally agree	20 (11.1%)
Neither agree nor disagree	57 (31.7%)
Disagree	7 (3.9%)
I do not make adjustments to my treatment without consulting my doctor first.	
Agree	122 (67.8%)
Totally agree	16 (8.9%)
Neither agree nor disagree	33 (18.3%)
Disagree	9 (5%)
When I have a flare, I increase my dose of corticosteroids without consulting with my doctor.	
Agree	35 (19.4%)
Totally agree	7 (3.9%)
Neither agree nor disagree	39 (21.7%)
Disagree	93 (51.7%)
Totally disagree	6 (3.3%)
Taking anti-inflammatory drugs is a cardiovascular risk factor.	
Agree	91 (50.6%)
Totally agree	5 (2.8%)
Neither agree nor disagree	66 (36.7%)
Disagree	16 (8.9%)
Totally disagree	2 (1.1%)
Compared to other people of the same age and sex as you, how do you perceive your risk of developing a CVDs in the future in the next ten years?	
Much lower	13 (7.2%)
Slightly lower	23 (13%)
Neither lower nor higher	42 (23%)
Slightly higher	50 (27%)
Moderately higher	34 (19%)
Much higher	18 (10%)

Knowledge of traditional CV risk factors and health assessment

Results from part 3 of the survey are summarized in Tables 4 and 5 included in the supplementary data.

When assessing patients' perceptions, 164 (91.1%) agreed that maintaining a healthy lifestyle was important to them. Only 71 (39.4%) stated that exercising 2–3 times per week was part of their routine. Additionally, 134 (74.5%) and 136 (75.6%) reported avoiding foods with high salt and sugar content, while only 122 (67.7%) avoided tobacco exposure. In contrast, 149 (82.8%) avoided alcohol consumption. Furthermore, 162 (90%) emphasized the importance of following their doctor's recommendations. However, only 81 (45%) believed that their autoimmune disease could increase their risk of a heart attack, even without other risk factors. A total of 116 (64.4%) patients made significant lifestyle changes after diagno-

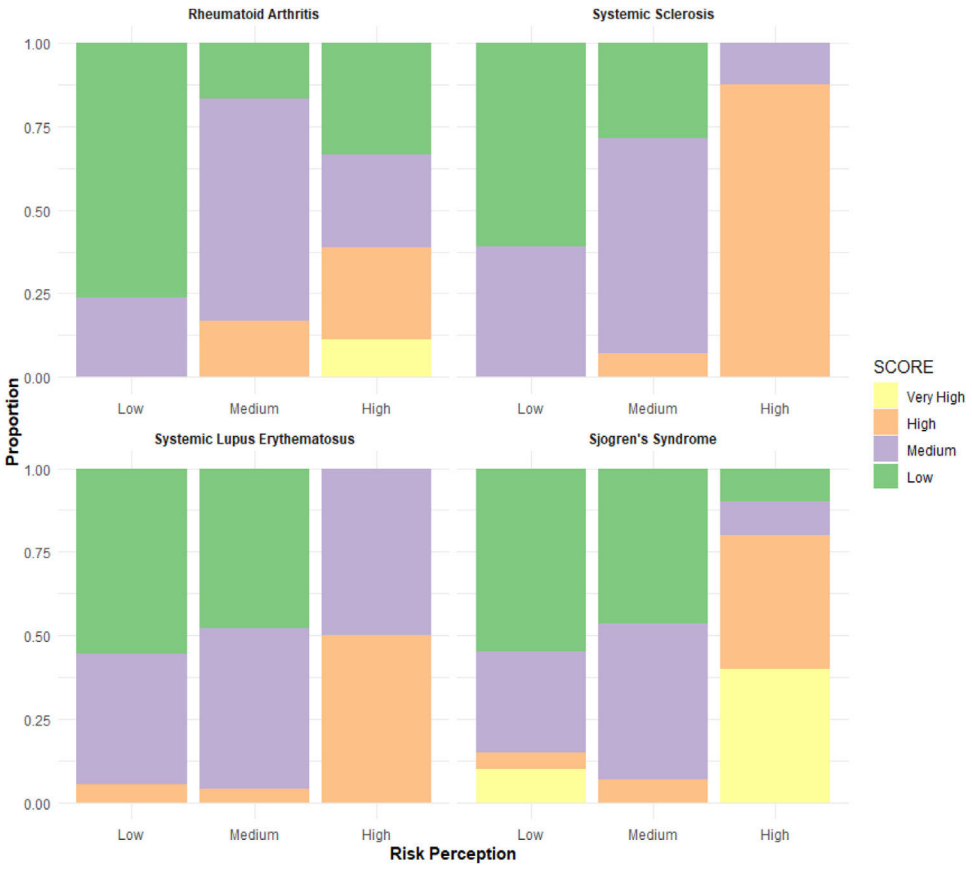

Fig. 1. Association between SCORE index and patient's perception of CV risk stratified by disease.

sis. Additionally, 138 (76.7%) reported not altering their treatment without consulting their doctor, while 42 (23.3%) admitted to independently increasing corticosteroid doses during a flare. Notably, 84 (46.7%) were unaware that NSAIDs pose a cardiovascular risk factor.

Regarding the perception of the risk of developing cardiovascular diseases in the next ten years, 36 (20%) considered it lower, 41 (23%) neither lower nor higher, and 56% perceived it as higher. Categorizing patients by risk level, 100 (45%) were classified as low risk, 67 (37%) as moderate risk, 23 (12.8%) as high risk, and 11 (5.6%) as very high risk.

Cardiovascular risk and risk perception

When assessing the association between the patient's SCORE index and their perception of CV risk, we find that all diseases present a correlation between these two variables ($p < 0.05$), except for patients with SLE ($p = 0.27$).

Mean SCORE was 2.3 ± 1.98 for SLE; 1.92 ± 1.8 for RA; 1.72 ± 0.82 for SS and 2.01 ± 1.2 for SSc. Fig. 1 reflects the association between the SCORE index represented by the different colors (low as green, medium as purple, high as orange and very high as yellow) and the patient's perception of CV risk stratified by disease represented by the abscissa (low, medium and high). There was also a significant association between comorbidity index measured by CCI and risk perception for all the disease groups ($p < 0.001$).

When analyzing the influence of age, working status and education in CVD risk perception, we found an association between CVD risk perception and age ($p = 0.01$). Patients over 40 years of age exhibited a higher perception of CVD risk perception than younger patients. Meanwhile, no differences were found regarding working status ($p = 0.19$) nor education level ($p = 0.06$).

Discussion

Our study aims to assess the prevalence of cardiovascular risk factors and events in autoimmune diseases (SSc, RA, SLE, and SS). Additionally, we conducted a survey to evaluate patients' self-perceived cardiovascular risk and compared it with the actual risk assessed using SCORE and Charlson Comorbidity Index (CCI).

Hypertension emerged as the most prevalent cardiovascular risk factor across all four diseases, followed by dyslipidemia and diabetes, aligning with findings in existing literature.[17–21] Concerning cardiovascular events, the most prevalent included valvular heart disease, arrhythmias, congestive heart failure, and deep vein thrombosis. While valvular disease is often associated with autoimmune diseases, limited data exist on its prevalence in these patients.[22–24]

When examining patients' perception of cardiovascular risk, a majority prioritized a healthy lifestyle and made significant post-diagnosis changes, such as avoiding high-salt and high-sugar foods; however, only 39.4% reported exercising 2–3 times per week. Notably, only 45% acknowledged the association between their autoimmune disease and an elevated cardiovascular risk, and 53.3% were aware of NSAIDs posing a cardiovascular risk. These findings suggest that while patients emphasize health, some behaviors associated with increased cardiovascular risk, including corticosteroid and anti-inflammatory treatment, remain unknown. Additionally, a significant number of patients were unaware of the higher cardiovascular morbidity and mortality rates associated with IMIDs.

Several responses raise concerns, particularly the admission of physical inactivity despite physicians' exercise recommendations.

Moreover, 44% had a history of smoking, despite acknowledging it as a cardiovascular risk factor. A Lancet study emphasized that common autoimmune diseases, including SLE and SSc, are linked to increased cardiovascular risk, underscoring the underestimated contribution of these diseases to cardiovascular disease. Despite this, awareness is low, leading to overlooked cardiovascular prevention measures.[25]

Risk perception significantly influences individual risk reduction efforts.[26,27] More than half of the patients perceived a high risk of developing CVDs in the next ten years. Correlation analysis revealed a significant association between patients' actual cardiovascular risk and their perception across all diseases except for SLE. This implies that SLE patients may be at a higher risk for future cardiovascular disease, potentially underestimating their risk, highlighting the importance of targeted interventions to improve risk perception and promote risk reduction behaviors. Patients with severe clinical symptoms, such as RA, may have a more realistic perception of their health, potentially overestimating their cardiovascular risk. Additionally, younger age at SLE diagnosis could contribute to underestimation due to an association between cardiovascular diseases and classic risk factors typically seen in older patients.

It was observed that patients with a higher number of comorbidities, as evaluated by the Charlson Comorbidity Index (CCI), and those with an actual cardiovascular risk assessed by the Systematic Coronary Risk Evaluation (SCORE) tend to have an increased perception of their cardiovascular risk. The majority of participants in the study had attained at least a secondary education, possibly contributing to their heightened perception and awareness of cardiovascular risk. However, a review of the existing literature on the association between risk perception and actual cardiovascular risk in patients with autoimmune diseases revealed limited information.

Regarding cardiovascular disease (CVD) risk perception, previous studies have primarily focused on the influence of risk perception outcomes, emphasizing the importance of its accuracy. Factors such as gender, age, education level, and socioeconomic status have been reported to be associated with CVD risk perception.[28,29] However, some studies suggest no significant differences in CVD risk perception across various demographic groups.[30,31] Our findings indicate that age indeed influences risk perception, with older patients demonstrating a higher awareness of their risk. Surprisingly, education level was not associated with an increased perception of risk. These results suggest insufficient awareness of CVD risk factors, highlighting the urgent need for improved promotion of CVD prevention during routine medical visits.

The study has limitations that warrant consideration, as they may introduce potential biases or imprecision. One limitation pertains to the issue of representativeness resulting from matching patients based on sex and age. While this approach was employed to control for potential confounding factors, it may unintentionally limit the diversity of the study population, thereby affecting the external validity of the findings. The absence of a control group consisting of "healthy" individuals hampers the ability to draw definitive conclusions about the observed associations and prevents comparisons and assessments of prevalence in the study population. Relying on self-reported information during clinical interviews to determine the presence of cardiovascular disease, traditional risk factors, and disease-related variables may also limit the accuracy of our data and subsequent findings, potentially introducing recall bias or misclassification. Additionally, the cross-sectional design of the study prevents establishing the directionality of associations between variables, making it challenging to establish causal relationships.

Our data underscore the necessity of developing effective strategies for cardiovascular disease awareness and screening protocols in patients with autoimmune diseases. This study represents one of the initial endeavors to evaluate risk perception across various autoimmune diseases. We believe that this work can enhance knowledge and awareness of cardiovascular disease, educating physicians on how to inform and guide their patients toward a healthy lifestyle during outpatient visits.[32,33] Rheumatologists should explore methods to identify and address cardiovascular risk factors, encompassing screening, risk factor modification, and the evaluation and treatment of symptomatic patients. Patients need education about their heightened cardiovascular risk, the importance of treatment adherence, symptom recognition, and strategies to reduce modifiable CVD risks. Collaboration with specialized preventive units and primary care is encouraged to initiate appropriate therapy and mitigate the consequences of cardiovascular risk factors. Furthermore, longitudinal studies with extended follow-up periods and larger cohorts are warranted to establish the prevalence of cardiovascular risk factors in patients with autoimmune diseases and to develop valid risk stratification tools for preventing and managing cardiovascular diseases.

Conclusion

Patients with Sjögren's Syndrome (SS), Rheumatoid Arthritis (RA), and Systemic Sclerosis (SSc) demonstrated a heightened perception of their cardiovascular risk, and this perception correlated with their actual risk and preexisting comorbidities. However, patients appear to lack awareness of certain cardiovascular risk behaviors that could adversely affect their health. Tailored education programs addressing cardiovascular risk, specifically designed for patients with autoimmune diseases, should be developed and implemented in outpatient clinics at the time of diagnosis and during follow-up.

Key-points

- Patients with SS, RA, and SSc showed an elevated perception of their cardiovascular risk, while those with Systemic Lupus Erythematosus (SLE) exhibited a lower perception.
- An association between the SCORE index, comorbidities, and the patient's perception of cardiovascular risk, stratified by disease, was identified.
- Patients demonstrate a lack of awareness regarding certain cardiovascular risk behaviors that could be detrimental to their health.

Ethics approval and consent to participate

The project, together with the Patient Information Sheet and Informed Consent, was approved by the Research Ethics Committee of the University Asistencial Complex of León in February 2023 (No. 2208).

Data availability

All data is available in the article.

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Conflict of interests

The authors declare that they have no competing interests.

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