Original Research Article

Assessment of cardiovascular risk in patients with chronic inflammatory rheumatic diseases

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Abstract

Aims & Objective: This study assessed cardiovascular risk using SCORE2 in patients with Chronic Inflammatory Rheumatic Diseases CIRD and explored its association with inflammatory markers.

Materials and Methods: This cross-sectional study, was conducted in the rheumatology. A department of Al Ayachi hospital in Morocco, between 2021 and 2024, and included patients over 40 years of age with confirmed CIRD.

Results: This study included 203 CIRD patients: 69% had rheumatoid arthritis (RA), 25.6% had spondyloarthritis (SpA), and 5.4% had undifferentiated CIRD. RA patients were older and predominantly female, while SpA was more frequent in younger males. Inflammatory activity and use of biologic therapies were comparable across groups, but RA patients more often received csDMARDs and glucocorticoids, while NSAIDs were more common in SpA. The overall median SCORE2 was 3.75, indicating moderate cardiovascular risk, significantly higher in RA (4.1) than SpA (2.6) (p = 0.027). SCORE2 was independently associated with NSAID and corticosteroid use. In the SpA group, corticosteroid use and radiographic disease progression were linked to higher SCORE2, while higher BASDAI scores correlated with lower risk. For RA, seropositivity was associated with higher SCORE2. A moderate inverse correlation was found between CRP and lipid levels, confirming the influence of inflammation on lipid profiles.

Conclusion: Patients with CIRD, particularly those with RA, exhibit a moderate cardiovascular risk profile. Our findings suggest that SCORE2 is linked to chronic use of NSAIDs and glucocorticoids, highlighting the need for cautious prescribing and a holistic approach to CV risk management in this population.

Keywords: Cardiovascular risk, Score 2, CIRD, Rheumatoid arthritis, Spondyloarthritis.

1. Introduction

Cardiovascular diseases (CVD) such as atherosclerosis, myocardial infarction, and stroke are the most common comorbidities in rheumatic diseases, significantly increasing mortality.[1] Extensive data on rheumatoid arthritis (RA), spondyloarthritis (SpA), and psoriatic arthritis (PsA) demonstrate that the prevalence and incidence of cardiovascular pathologies are elevated by 30% compared to the general population. This risk is even higher, increasing by up to 50%, in patients with an additional associated autoimmune disease.[2]

Chronic inflammatory rheumatic diseases (CIRDs) contribute to an increased cardiovascular disease (CVD) risk through a combination of persistent systemic inflammation, genetic predisposition, and conventional cardiovascular risk factors (such as dyslipidemia, hypertension, and insulin resistance) within this population.[3]

Driven by traditional cardiovascular risk factors and chronic systemic inflammation, rheumatoid arthritis (RA) significantly increases the risk of cardiovascular disease (CVD), contributing to a 45-60% higher CVD-related mortality and ultimately leading to reduced life expectancy.[4] Moreover, a Danish study found that RA confers a 2-3 times higher risk of myocardial infarction (MI) and cardiovascular death, comparable to that observed in diabetes.[3,5]

Spondyloarthritis (SpA), including ankylosing spondylitis (AS) and psoriatic arthritis (PsA), is linked to increased cardiovascular risk, though less studied than in rheumatoid arthritis (RA), with limited data on cardiovascular mortality in AS. PsA increases cardiovascular risk by 43% and stroke risk by 22%, while AS raises the risk

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of acute coronary syndrome (RR = 1.4-3.0) and overall CV events by 30-50%.[6,7]

Assessing cardiovascular risk in patients with inflammatory rheumatic diseases (IRD) is challenging, as conventional scores often fail to account for disease activity and IRD-specific factors. European guidelines recommend using validated risk assessment tools every five years or following significant changes in treatment.[4,8]

The 2021 guidelines from the European Society of Cardiology (ESC) recommend using the Systemic Coronary Risk Estimation tools (SCORE2 and SCORE2-OP (for older adults)) to estimate the 10-year risk of fatal and non-fatal cardiovascular events (available at https://u-prevent.com/calculators).[5] Although coronary artery calcium scoring and carotid Doppler imaging may be considered for screening, their clinical benefit has not yet been firmly established.[9] Meanwhile, newer risk models that integrate inflammatory markers such as DAS28-gGT are currently undergoing validation.[10]

This study aimed to evaluate cardiovascular risk with SCORE 2 in CIRD patients and examined its relationship with disease outcomes.

2. Materials and Methods

2.1. Study design

This cross-sectional study was conducted in the Rheumatology Department of Al Ayachi Hospital, Rabat-Salé, Morocco, and included patients with chronic inflammatory rheumatic diseases (CIRDs) who were followed between 2021 and 2024.

The study protocol was reviewed and approved by the local ethics committee, CERB (The Ethics Committee for Biomedical Research of Rabat).

Cardiovascular risk was assessed using the SCORE2 algorithm, a validated tool published by the European Society of Cardiology (ESC). No modifications were made to the score. The SCORE2 model was used solely as a methodological instrument, with appropriate citation of the original source.

2.2. Objectives

The objectives of this study were to evaluate cardiovascular risk using SCORE2 in patients with chronic inflammatory rheumatic diseases (CIRDs), to examine the association between SCORE2 and disease-related features, and to investigate the relationship between inflammatory and lipid markers in this population.

2.3. Inclusion criteria

We included all patients aged over 40 years with a confirmed diagnosis of a chronic inflammatory rheumatic disease (CIRD), including rheumatoid arthritis (according to the 2010 ACR/EULAR criteria), spondyloarthritis (according to the 2009 ASAS criteria), and undifferentiated chronic inflammatory rheumatism. Eligibility required available data on comorbidities, medication use, blood pressure measurements, and laboratory test results.

2.4. Exclusion criteria

Patients under 40 years of age and those with a history of major cardiovascular diseases, such as ischemic heart disease, stroke, peripheral arterial disease, or heart failure, were excluded, as SCORE2 is intended for primary prevention and cardiovascular risk assessment.

2.5. Data collection

Data collection focused on inflammatory, metabolic, and cardiovascular parameters extracted from the hospital's electronic medical records of patients under follow-up. These included lipid profile components such as triglycerides (TG), total cholesterol (TC), low-density lipoprotein cholesterol (LDL-C), high-density lipoprotein cholesterol (HDL-C), and uric acid; glycemic control assessed by glycated hemoglobin (HbA1c); blood pressure measurements (systolic SBP and diastolic DBP); body mass index (BMI); inflammatory markers including erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP); as well as disease activity scores-DAS28 for rheumatoid arthritis, and BASDAI and ASDAS-CRP for spondyloarthritis.

2.6. Definition of score 2

SCORE2 (Systematic Coronary Risk Evaluation 2) is a cardiovascular risk assessment tool developed by the European Society of Cardiology (ESC) to estimate the 10-year risk of both fatal and non-fatal cardiovascular disease (CVD) events, such as myocardial infarction and stroke. It is designed for individuals aged 40 to 69 years and represents an update of the original SCORE model, which only accounted for fatal events.[11,12]

The algorithm uses routinely available clinical parameters: age, sex, smoking status, systolic blood pressure, and cholesterol levels.

Importantly, SCORE2 stratifies risk based on country-specific cardiovascular mortality rates, allowing tailored risk estimation across regions with low, moderate, high, or very high baseline CVD risk. According to the World Health Organization, Morocco is classified as a "very high-risk" country for atherosclerotic cardiovascular disease (ASCVD), indicating a high baseline cardiovascular risk.[5] This classification underscores the importance of using tools like SCORE2 for effective cardiovascular risk stratification and prevention strategies.

2.7. Clinical application

SCORE2 is recommended by the ESC guidelines for primary prevention in middle-aged adults and is intended to support

decision-making regarding lifestyle interventions, lipid-lowering therapy, and antihypertensive treatment.

For individuals aged 70 years and older, the adapted version "SCORE2-OP" is used to guide risk estimation in older populations. [11,12]

For individuals with diabetes, the SCORE2-Diabetes model has been specifically developed to estimate the 10-year risk of cardiovascular disease (CVD). As part of the broader SCORE2 risk prediction algorithms, it integrates multiple variables to provide a more personalized and accurate risk assessment in this high-risk population.[5]

2.8. Statistics

Descriptive statistics were used to summarize the main characteristics of the study population. For quantitative variables with a normal distribution, results were presented as means with standard deviations ($\bar{x} \pm$ SD). Variables that did not follow a normal distribution were expressed as medians with interquartile ranges (median [25th-75th percentiles]). Categorical variables were expressed as counts and percentages (n [%]).

To compare characteristics across various CIRD subgroups, appropriate statistical tests were applied according to the type and distribution of the variables: a one-way ANOVA for parametric continuous variables, the Kruskal-Wallis test for non-parametric continuous variables, and the chi-squared test for categorical variables.

To investigate the association between SCORE2 and various characteristics of chronic inflammatory rheumatic diseases (CIRDs), linear regression analysis was performed. Subsequently, correlation tests were conducted to explore the relationships between inflammatory markers and lipid profile parameters.

All statistical analyses were performed using JAMOVI software. A p-value < 0.05 was considered statistically significant.

3. Results

3.1. Description of the study population and disease characteristics

A total of 203 patients with chronic inflammatory rheumatic diseases (CIRDs) were included in the study. Among them, 140 patients (69.0%) had rheumatoid arthritis (RA), 52 patients (25.6%) had spondyloarthritis (SpA), and 11 patients (5.4%) had undifferentiated chronic inflammatory rheumatic disease.

The mean age of the entire cohort was 56.9 ± 11.1 years, and women accounted for 159 cases (78.3%). Patients with RA were significantly older and predominantly female, whereas SpA was more common among younger male patients.

The median disease duration was 11 years (interquartile range IQR: 6-18). Inflammatory markers showed a median erythrocyte sedimentation rate (ESR) of 37 mm/h (IQR: 22-59.3) and a median C-reactive protein (CRP) level of 15.7 mg/L (IQR: 5-37). Patients with SpA tended to have a longer disease duration, while those with undifferentiated forms had a significantly shorter one. Specifically, the median disease duration was 11.5 years (IQR: 6-18) for RA, 13.9 ± 8 years for SpA, and 4 years (IQR: 3.5-6) for undifferentiated disease.

In the RA subgroup, seropositivity was observed in 88.4% of patients, corresponding to the presence of rheumatoid factor and/or anti-citrullinated protein antibodies. Structural joint damage was common, with erosions detected in 80.7% of patients.

In the SpA subgroup, radiographic sacroiliitis was identified on pelvic X-rays in 83.7% of cases. Coxitis was present in 47.7% of patients and was bilateral in 76.2% of these cases.

Inflammatory activity, assessed using disease-specific composite indices, was comparable across groups, with no statistically significant differences. Among patients with RA, the mean Disease Activity Score-28 (DAS28) was 4.93 ± 1.31. For SpA, the median Ankylosing Spondylitis Disease Activity Score based on CRP (ASDAS-CRP) was 3.47 (IQR: 2.36-3.94), and the mean Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) was 3.8 ± 1.93.

The use of biologic disease-modifying antirheumatic drugs (bDMARDs) did not differ significantly between groups (p = 0.25). However, conventional synthetic DMARDs (csDMARDs) were prescribed significantly more often in RA patients compared with those with SpA or undifferentiated disease (p < 0.001).

Treatment with more than two lines of biologic therapy (indicative of difficult-to-treat disease) was observed in 26.1% of patients with SpA and 7.5% of those with RA, but not in patients with undifferentiated disease (p = 0.005).

Glucocorticoid therapy was significantly more frequent in RA patients, being used in 73.2% of cases, compared with 8% of SpA patients and 50% of those with undifferentiated disease (p < 0.001). Conversely, non-steroidal anti-inflammatory drugs (NSAIDs) were used more frequently in SpA (46.7%) compared with RA (20.8%), a difference that was statistically significant (p = 0.008).

The main characteristics of the study population are summarized in summarized in **Table 1**.

Table 1: Sociodemographic features and clinical characteristics of the population included in the study

Variables	Patients CIRD N=203 (100%)	Rheumatoid arthritis N = 140 (69%)	Spondyloarthritis N = 52 (25.6%)	Undetermined CIRD N=11 (5.4%)	t-statistic**	p value
Sociodemographic features						
Age	56.9 ±11.1	59.7 ± 10.7	46.5 (43.8-54.3)	55 (46-61.5)	33.8	< 0.001
Sex, n (%)						
Female	159(78.3)	124 (88.6)	25 (48.1)	10 (90.9)	37.7	< 0.001
Male	44 (21.7)	16 (11.4)	27 (51.9)	1 (9.1)		
Clinical characteristics						
Disease duration, years	11 (6-180)	11.5 (6-18)	13.9 ± 8	4 (3.5-6)	9.01	< 0.01
Erosion (RA), n (%)	-	71 (80.7)	-	-	-	-
Seropositivity (RA), n (%)	-	84 (88.4)	-	-	-	-
RF*	-	128 (33.5-512)	-	-	-	-
ACPA*	-	125 (22-260)	-	-	-	-
Rx-SpA*, n (%)	-	-	36 (83.7)	-	-	-
HLA B27 positif, n (%)	-	-	3(7)	-	-	-
HLA B27 unknown, n (%)	-	-	44 (81.4)	-	-	-
Coxitis, n (%)	-	-	21 (47.7)	-	-	-
Coxitis double-sided, n (%)	-	-	16 (76.2)	-	-	-
Coxitis one-sided, n (%)	-	-	5 (23.8)	-	-	-
CRID D2T / D2M*, n (%) (use > 2 biological drugs)	22 (11.7)	10 (7.5)	12 (26.1)	0	12.7	0.005
ASDAS-CRP	-	-	3.47 (2.36-3.94)	-	-	-
BASDAI	-	-	3.8 ± 1.93	-	-	-
DAS28-ESR	4.92 ± 1.28	4.93 ± 1.31	4.9 (4.4-5.3)	5.04 (4.7-5.6)	0.28	0.87
ESR, mm/first hour	37 (22-59.3)	35 (19-58)	38.5 (30-57)	50.2 ± 25.1	3.48	0.17
CRP, mg/L	15.7 (5-37)	15.7 (5.7-38.1)	19.9 (4.5-32.9)	7.5 (3.8-30.4)	1.34	0.51
Current treatment						
bDMARD* use, n (%)	125 (65.1)	90 (66.2)	31 (67.4)	4 (40)	2.95	0.25
CsDMARD* use, n (%)	50 (38.8)	39 (47.6)	6 (15.4)	5 (62.5)	13.6	< 0.001
GC* use, n (%)	110 (55.6)	101 (73.2)	4 (8)	5 (50)	63.3	< 0.001
Dose of GC	5 (5-7.5)	5 (5-7.5)	5.63 ± 1.25	10 (8.7-11.3)	4.02	0.13
Duration of GC	10 (4-16)	10 (4-16)	5 (3-10)	12 (7-21)	0.48	0.79
NSAIDs* use, n (%)	33 (34.4)	10 (20.8)	21 (46.7)	2 (66.7)	8.3	0.008
Duration of NSAIDs	9 (3.7-20)	7 (5.5-12)	11 (2.5-20)	-	0.0037	0.95

*CIRD = chronic inflammatory rheumatoid diseases, RA = rumathoid arthritis, RxSpA = *radiographic spondyloarthritis*, RF = rheumatoid factor, ACPA = anti-citrullinated protein antibodies, D2T=difficult to treat, D2M=difficult to manage, bDMARD= Biologic Disease-Modifying Anti-Rheumatic Drug, CsDMARD= Conventional synthetic Disease-Modifying Anti-Rheumatic Drug, NSAIDs = non-steroidal anti-inflammatory drugs, GC=Glucocorticoid
** To compare characteristics across various CIRD subgroups, appropriate statistical tests were applied according to the type and distribution of the variables: a one-way ANOVA for parametric continuous variables, the Kruskal-Wallis test for non-parametric continuous variables, and the chi-squared test for categorical variables.

Table 2: Description of cardiovascular risk factors in patients with CIRD

Variables	Patients CIRD N=203 (100%)	Rheumatoid arthritis N = 140 (69%)	Spondyloarthritis N = 52 (25.6%)	Undetermined CIRD N=11 (5.4%)	t-statistic **	p value
Cardiovascular risk factors						
Diabetes, n (%)	47 (23.4)	34 (24.3)	11 (22)	2 (18.8)	0.283	0.96
Hypertension, n (%)	51 (25.4)	35 (25.4)	13 (25)	3 (27.3)	0.0248	1
Sedentary lifestyle, n (%)	83 (40.9)	59 (42.1)	21 (40.4)	3 (27.3)	0.94	0.7
Heart diseases, n (%)	8 (3.9)	6 (4.3)	0	2 (18.2)	8.07	0.025
SBP* (cmHg)	12.6 ± 1.46	12.7 ± 1.54	12.5 ± 1.22	12.3 ± 1.42	1.01	0.38
DBP* (cmHg)	7.09 ± 0.97	7.12 ± 0.99	7.1 ± 0.94	7 ± 0.894	0.259	0.77
BMI* (kg/m²)	27.1 ± 5.6	27 ± 5.47	27 ± 6.01	29 ± 5.51	0.491	0.62
TG* (g/L)	1.09 ± 0.49	1.11± 0.52	0.96 (0.71-1.37)	1.13 (0.73-1.26)	0.633	0.73
TC* (g/L)	1.85 ± 0.43	1.87 ±0.42	1.75 ± 0.43	2.03 (1.86-2.08)	3.56	0.17
HDL* (g/L)	0.5 ± 0.14	0.52 ±0.12	0.44 (0.34-0.5)	0.53 (0.46-0.67)	10.6	0.005

LDL* (g/L)	1.14 ± 0.35	1.13 ±0.35	1.14 ± 0.34	1.14 (1.08-1.35)	0.796	0.67
Uric acid (mg/l)	48.8 ± 15.2	47± 13	47.7 (39.7-57.6)	55.7 (49.9-64.6)	2.2	0.33
HbA1C* (%)	6.24 (5.5-6.5)	5.8 (5.5-6.4)	5.7 (5.4-6.5)	5.9 (5.8-6.5)	1.8	0.41
Smoking status, n (%)	20 (10)	9 (6.5)	11 (21.6)	0		
Past smokers	12 (66.7)	6 (60)	6 (75)	-	10.8	0.009

* SBP= systolic blood pressure, DBP= diastolic blood pressure, TG= Triglycerides, TC= Total Cholesterol, HDL= High-Density Lipoprotein Cholesterol, LDL= Low-Density Lipoprotein Cholesterol, HbA1C= Glycated Hemoglobin.

** To compare characteristics across various CIRD subgroups, appropriate statistical tests were applied according to the type and distribution of the variables: a one-way ANOVA for parametric continuous variables, the Kruskal-Wallis test for non-parametric continuous variables, and the chi-squared test for categorical variables

Table 3: Linear regression analyzing the association between SCORE 2 and CIRD features

	Score 2		
	Coefficient (β)	IC 95%	p-value
Duration of GC	0.48	[0.01 , -0.94]	0.045
NSAIDs use	-6.5	[-12.9 , -0.24]	0.042
ESR	-0.004	[-0.1, 0.09]	0.92
CRP	0.03	[-0.07, 0.13]	0.57
Sedentary lifestyle	1.21	[-3.44, -5.87]	0.59
BMI	-0.22	[-0.7, 0.26]	0.36
Duration of disease	-0.1	[-0.5, 0.27]	0.57
Dose of GC	-0.03	[-0.22, 0.17]	0.75

Table 4: Multivariable regression analysis of SCORE2 in patients with spondyloarthritis

	Score 2		
	Coefficient (β)	IC 95%	p-value
Use of GC	5.6	[0.49 , 10.7]	0.03
NSAIDs use	-1.42	[-5.86 , 3.02]	0.48
ESR	0.07	[-0.01 , 0.16]	0.09
CRP	0.015	[-0.03 , 006]	0.49
BASDAI	-2.8	[-4.36 , -1.35]	0.002
ASDAS CRP	0.86	[-0.92 , 2.64]	0.3
RxSpA	8.16	[1.06 , 15.2]	0.03
Coxitis	-3.2	[-6.9 , 0.57]	0.09
DTM criterion	-3.15	[-6.71 , 0.42]	0.08
BMI	0.25	[-0.09 , 0.59]	0.12
Duration of disease	-0.005	[-0.23 , 0.22]	0.96
bsDMARDs	0.03	[-3.72 , 3.77]	0.99
CsDMARDs	-2.11	[-6.68 , 2.46]	0.32

Table 5: Multivariable regression analysis of SCORE2 in patients with rheumatoid arthritis

	Score 2		
	Coefficient (β)	IC 95%	p-value
Use of GC	3.43	[-0.27 , 77.1]	0.07
ESR	0.034	[-0.026 , 0.094]	0.25
CRP	-0.03	[-0.08 , 0.022]	0.24
DAS 28	-0.73	[-2.13 , 0.66]	0.29
Seropositivity	6.85	[1.27 , 12.4]	0.02
RF	0.004	-	0.09
ACPA	0.001	[-0.004 , 0.006]	0.68
Erosion	-0.8	[-4.4 , 2.8]	0.65
DTM criterion	2.52	[-3.81 , 8.86]	0.42
BMI	-0.13	[-0.39 , 0.14]	0.33
Duration of disease	-0.04	[-0.21 , 0.13]	0.65
bsDMARDs	-0.41	[-3.18 , 2.37]	0.77
CsDMARDs	-1.55	[-4.4 , 1.33]	0.28

**Table 6:** Association between lipid and inflammatory markers

Variables	Correlation	p-value	Spearman's Coefficient (r)
CRP - CT	Moderate	0.004	-0.22
CRP - HDL	Moderate	0.02	-0.20
CRP - LDL	Moderate	0.009	-0.22
CRP - TG	None	0.51	-0.05

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3.2. Cardiovascular description of population and metabolic features

Diabetes, hypertension, and sedentary lifestyle were comparably prevalent across all subgroups without no significant difference (p>0.05). SpA patients had significantly more past smoking than RA patients (p=0.009). HDL levels were significantly lower in SpA compared to both RA and unclassified chronic inflammatory rheumatic diseases (UCIRD) (p=0.005). However, all other cardiometabolic parameters, including total cholesterol, triglycerides, and LDL levels, showed no statistically significant differences between the groups (**Table 2**).

3.3. Cardiovascular risk in our population assessed by Score 2

The median SCORE2 among all patients with chronic inflammatory rheumatic diseases was 3.75 (IQR: 1.8-6.6), indicating a moderate cardiovascular risk. When analyzed by disease category, the median SCORE2 was higher in patients with rheumatoid arthritis (4.1, IQR: 2.1-7.2) compared with those with spondyloarthritis (2.6, IQR: 1.6-4.27). This difference was statistically significant (p = 0.02). The distribution of SCORE2 values across disease groups is illustrated in **Figure 1**.
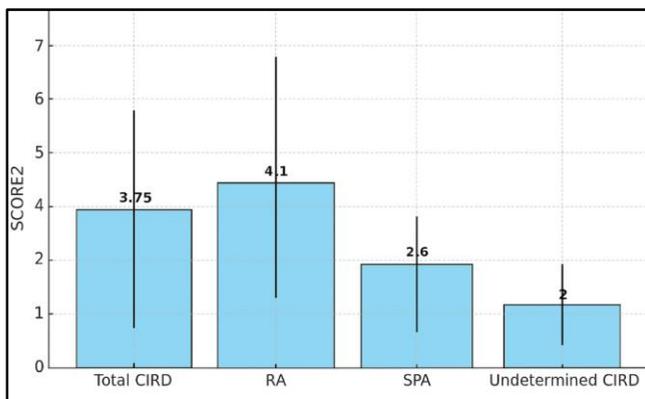
Figure 1: Cardiovascular risk evaluation by SCORE2 in patients with CIRD

3.4. Disease features associated with the cardiovascular risk

In the multivariate regression analysis, SCORE2 was significantly associated with NSAID use (p = 0.04; 95% confidence interval) and with the duration of corticosteroid therapy, which showed the same p-value and confidence interval. However, no significant correlation was found between SCORE2 and inflammatory markers, BMI, disease duration, CIRD subtype, or composite disease activity scores, as presented in **Table 3**.

3.5. Subgroups analysis

Among patients with spondyloarthritis, corticosteroid use (β = 5.58; 95% CI, 0.91-10.25; p = 0.02) and the presence of radiographic disease (β = 8.11; 95% CI, 1.90-14.32; p = 0.01) were independently associated with higher SCORE2 cardiovascular risk. In contrast, higher BASDAI scores were associated with lower SCORE2 values (β = -2.85; 95% CI, -4.24 to -1.46; p = 0.001). No significant associations were found for inflammatory markers (CRP, ESR, ASDAS-CRP), conventional DMARDs, NSAID use, or biologic therapy, as presented in **Table 4**.

In the subgroup of patients with rheumatoid arthritis, regression analysis showed that seropositivity was significantly associated with higher SCORE2 values (β = 6.85; 95% CI, 1.27-12.40; p = 0.02). In contrast, no significant associations were observed between SCORE2 and treatment type, CIRD severity, BMI, or inflammatory markers, as shown in **Table 5**.

3.6. Correlation between lipid and inflammatory markers

No significant correlation was observed between ESR and the various lipid markers. In contrast, CRP showed a moderate negative correlation with total cholesterol, HDL, and LDL levels, as presented in **Table 6**.

4. Discussion

4.1. Score 2 in CIRD

In our study, patients with chronic inflammatory rheumatic diseases (CIRD) presented an overall moderate cardiovascular risk, with a median SCORE2 of 3.75 [1.8-6.6]. This risk was significantly higher in patients with rheumatoid arthritis (RA) (4.1 [2.1-7.2]) compared with those with spondyloarthritis (SpA) (2.6 [1.6-4.27]) and UCIRD (p = 0.027). These results are consistent with the CARMA study, which found that high or very high cardiovascular risk was more frequent in RA patients (21%) than in those with PsA (14.4%) or AS (12%), while most participants (with or without CIRD) were classified as having moderate risk (SCORE2: 1%-5%).[3]

When analysing the association between SCORE2 and CIRD features in our patients, we found no significant association between SCORE2 and inflammatory markers, BMI, disease duration, CIRD subtype, or composite disease activity scores.

However, in the subgroup analysis of patients with RA, seropositivity was significantly associated with higher SCORE2 values (β = 6.85; 95% CI: 1.27-12.40; p = 0.02). These findings are in line with existing evidence showing that elevated anti-CCP antibodies are associated with more severe RA, increased systemic inflammation, and higher cardiovascular risk. Similarly, rheumatoid factor (RF), another major RA biomarker, has been linked to adverse cardiovascular outcomes such as ischemic stroke.[13] Furthermore, from 2011 to 2021, a total of 1149 RA patients were invited for cardiovascular screening, with 92% participating. At baseline, high-risk patients (mSCORE ≥ 5%) had longer disease duration, higher triglyceride levels, poorer health status, and more unhealthy lifestyle habits.[14]

When analysing the other subgroup of patients with SpA, we found that the presence of radiographic SpA (RxSpA) was independently associated with higher cardiovascular risk as assessed by SCORE2 (β = 8.11; 95% CI: 1.90-14.32; p = 0.01). Conversely, higher BASDAI score was independently associated with lower SCORE2 values (β = -2.85; 95% CI: -4.24 to -1.46; p = 0.001), whereas no significant associations were found between SCORE2 and inflammatory markers such as CRP, ESR, or ASDAS-CRP. These results are consistent with previous studies showing that structural damage is significantly associated with cardiovascular risk (as measured by the Framingham Risk Score), with syndesmophytes emerging as an independent predictor.[15] Similarly, another study comparing axSpA patients with matched controls reported higher cardiovascular risk and more carotid plaques, with radiographic damage strongly linked to SCORE.[16]

4.2. Prevalence of cardiovascular risk factors in CIRD

In our study, the prevalence of traditional cardiovascular risk factors was similar across the CIRD subgroups (RA, SpA, and UCIRD). In comparison, the CARMA study reported that PsA patients had a higher prevalence of these risk factors and metabolic syndrome features compared with the other groups, while smoking was more common in AS patients. Moreover, cardiovascular disease was more prevalent in RA patients (10.5%) than in AS (7.6%), PsA (7.2%), or non-inflammatory controls (6.4%).[3]

Bedeković et al. also reported that RA patients exhibited higher cardiovascular mortality and more cardiovascular risk factors despite being younger.[17] In contrast, axial SpA patients tend to smoke more but present fewer metabolic abnormalities, whereas PsA patients exhibit higher cardiovascular risk driven primarily by metabolic factors, resulting in increased rates of myocardial infarction, stroke, and heart failure.[18,19]

4.3. Correlation between lipid and inflammatory markers

In our study, CRP showed a moderate negative correlation with total cholesterol, HDL, and LDL levels, whereas ESR was not significantly associated with lipid parameters. This finding aligns with the literature, which indicates that dyslipidemia increases cardiovascular risk by about 73%, but its interpretation in inflammatory diseases such as RA is complicated by the "lipid paradox", where inflammation lowers cholesterol but paradoxically raises heart disease risk.[20] Similarly, in early axial SpA, systemic inflammation shows an inverse relationship with lipid markers (TC, ApoA1, ApoB), reflecting the same "lipid paradox".[20]

4.4. Association between cardiovascular risk and different therapies

Anti-inflammatory therapies have variable effects on cardiovascular risk in CIRD. Glucocorticoids are associated with increased risk, whereas methotrexate and TNF-α inhibitors may confer protective effects through inflammation control.[17,20]

In our study, among CIRD patients overall, SCORE2 was significantly associated with both NSAID use (p = 0.04) and the duration of corticosteroid therapy (p = 0.04). Conversely, no significant association was found between SCORE2 and treatment modalities (CsDMARDs and bsDMARDs) in the RA subgroup. In SpA patients, corticosteroid use was significantly linked to higher SCORE2 values (β = 5.58; 95% CI: 0.91-10.25; p = 0.02), whereas no significant relationships were observed with conventional DMARDs, NSAIDs, or biologic therapies. Relating these results to the literature, NSAIDs remain first-line therapy for axial SpA, but their cardiovascular impact is debated. Some studies suggest benefits through inflammation reduction, while others report higher risks of hypertension and adverse events depending on drug type, dose, and duration.[23] In RA, certain NSAIDs (e.g., rofecoxib, diclofenac) are linked to higher stroke risk, whereas others (e.g., celecoxib, etoricoxib) may be neutral or protective.[13]

Corticosteroids should be used sparingly due to their cardiovascular side effects.[24] TNF-α inhibitors, on the other hand, may reduce cardiovascular risk by limiting subclinical atherosclerosis, although the evidence is inconsistent.[25] Their impact on lipid profiles varies,[26,27] but infliximab has been associated with lower Framingham risk scores.[28] Overall, while TNF inhibitors generally tend to reduce cardiovascular events, newer agents such as tofacitinib show mixed safety profiles, highlighting the importance of individualized treatment that balances inflammation control with cardiovascular safety.[13]

4.5. Strengths and limitations of the study

A major strength of our study lies in being, to our knowledge, the first conducted in Morocco, and likely in the broader Maghreb region, to assess cardiovascular risk in patients with CIRD, including RA and SpA, using the SCORE2 algorithm. The study provides a comprehensive comparative analysis of these populations and explores the under-investigated area of lipid profile specificities within this demographic.

However, some limitations should be acknowledged. The study was performed at a single center and involved a relatively small sample size, which may limit the generalizability of the findings. Furthermore, its cross-sectional design prevents establishing causal relationships or assessing long-term disease progression. Future prospective studies with longitudinal follow-up would strengthen these observations and their clinical applicability.

4.6. Key messages for optimal cardiovascular risk assessment in CIRD

Estimating cardiovascular risk in RA is challenging, as conventional models often overlook disease-specific factors like activity level and extra-articular manifestations. SCORE is commonly adjusted with a 1.5 multiplier for RA patients to improve accuracy.[4,17] EULAR recommendations, initially for RA but applicable to other CIRDs, emphasize strict disease control and regular monitoring of traditional cardiovascular risk factors. They advise evaluating the total/HDL cholesterol ratio, using statins and RAAS (Renin-Angiotensin-Aldosterone System) inhibitors, limiting NSAIDs and corticosteroids, promoting smoking cessation, and encouraging regular aerobic exercise to reduce cardiovascular risk.[24]

5. Conclusion

This study demonstrates a moderate cardiovascular risk in patients with chronic inflammatory rheumatic diseases, with rheumatoid arthritis showing the highest SCORE2 values. Traditional cardiovascular risk factors were similar across subgroups, but disease-specific features, such as seropositivity in RA and structural damage in SpA were linked to increased risk.

Inflammation drives the 'lipid paradox' in which active disease lowers lipid levels but increases cardiovascular risk.

Glucocorticoid and NSAID use were associated with higher SCORE2 values, whereas methotrexate and biologic agents, particularly TNF-α and IL-6 inhibitors, may offer protective effects.

These findings emphasize the importance of systematic cardiovascular screening, multidisciplinary care, and careful management of both inflammation and traditional cardiovascular risk factors. Further large-scale, longitudinal studies are needed to confirm these results and guide tailored prevention strategies.

6. Source of Funding

None.

7. Conflict of Interest

None.

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