Published online . 2026 January **Original Article**

Evaluation of Cardiac Risk Factors in Patients with Rheumatoid Arthritis and Systemic Lupus Erythematosus

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Received 2025 March 06**; Accepted** 2025 June 04.

Abstract

Background: Rheumatoid arthritis (RA) is a systemic inflammatory disease with irreversible joint destruction. Chronic inflammation is also associated with cardiovascular disease. Systemic lupus erythematosus (SLE) is a connective tissue autoimmune disease characterized by varying clinical manifestations and severity.

Objectives: We aimed to evaluate the cardiac risk factors in patients with RA and SLE.

Methods: In this cross-sectional study, the files of 274 patients with RA and SLE who were referred to the rheumatology private clinic and hospitals were reviewed. Demographic and biochemical data were extracted. Anthropometric measurements and blood pressure were also measured. The statistical analysis was performed using Chi-Square and independent T-Test (SPSS software). A p-value <0.05 was considered statistically significant.

Results: Ninety-two point seven percent of the subjects were female. Two hundred twenty-eight patients had RA, and 46 patients had SLE. The mean waist circumference was significantly higher in RA patients compared to SLE patients (92.5 ± 15.3 vs 87.3 ± 12.8 cm, p = 0.04). No significant differences were observed in terms of the other cardiac risk factors. The rate of abdominal obesity (86.60%) and dyslipidemia (80.50%) was higher in the SLE than the RA patients. The prevalence of overweight and obesity (78.5%), hypertension (28.80%), diabetes (13.10%), history of heart disease (9.60%), and smoking (2.60%) was higher in the RA than the SLE patients.

Conclusion: Among the study population, there was a high rate of obesity, dyslipidemia, and abdominal obesity among the RA and SLE patients. Regular monitoring and timely strategies are essential to manage these risk factors and improve patients' outcomes.

Keywords: Rheumatoid arthritis, Systemic lupus erythematosus, Cardiovascular disease, obesity.

1. Background

Rheumatoid arthritis (RA) is a systemic inflammatory disease characterized by pain, stiffness, swelling, and joint destruction. This disease primarily affects synovial joints, leading to irreversible damage (1, 2). RA affects approximately 1% of the global population, reducing life expectancy and significantly contributing to morbidity (3).

RA typically presents between the ages of 20 and 60 years (4). Chronic inflammation in RA is closely linked to the exacerbation of atherosclerosis and cardiovascular disease (CVD). Studies indicated that individuals with RA have a significantly higher incidence of coronary artery disease (CAD), and CAD-related mortality rates are almost twice as high as those in the general population (5). Recent research has highlighted that the cardiovascular involvement in RA can lead to a 35-50% lifetime risk of premature mortality and a subsequent 10-year reduction in lifespan (5).

Systemic lupus erythematosus (SLE) is another systemic autoimmune disease with diverse clinical manifestations, including skin disorders, joint pain, cytopenia, neuropsychiatric disorders, and cardiovascular complications (6). SLE patients face a 2-5 times higher risk of atherosclerotic cardiovascular morbidity and mortality compared to their healthy counterparts (7). In young women with SLE, atherosclerosis occurs earlier and with more severe complications and mortality rates. Cardiovascular manifestations in subjects with RA and SLE are often underdiagnosed in clinical practice, as shown by postmortem studies revealing a higher occurrence of CVD than clinically estimated (8).

Recent research has further emphasized the heightened cardiovascular risk in RA and SLE. A study on cardiovascular risk management in RA patients revealed that traditional risk factors, such as hypertension and dyslipidemia, do not fully account for the increased CVD risk in these individuals. Non-traditional factors, including systemic inflammation, disease duration, and certain RA medications, also contribute significantly. Chronic inflammation and autoimmunity play crucial roles in accelerating atherosclerosis in RA patients, leading to higher cardiovascular morbidity and mortality (9).

Given the substantial cardiovascular risk associated with RA and SLE, it is imperative to evaluate cardiac risk factors in these patients periodically. Regular cardiovascular assessments, personalized interventions, and collaborative care strategies are essential to mitigate the heightened cardiovascular morbidity and mortality in this population. Regular cardiovascular assessments involve periodic screenings of traditional risk factors such as hypertension, dyslipidemia, and diabetes, as well as non-traditional factors like systemic inflammation and medication side effects. Personalized interventions include lifestyle modifications, such as diet and exercise, tailored to the patient's specific risk profile, and pharmacological treatments like statins and antihypertensive drugs. Collaborative care strategies emphasize the importance of coordinated efforts among rheumatologists, cardiologists, and primary care physicians to ensure comprehensive management of cardiovascular health in patients with RA and SLE (10-12). Thus, we aimed to assess the cardiac risk factors in RA and SLE patients.

2. Objective

We aimed to evaluate the cardiac risk factors in patients with RA and SLE.

3. Methods

3.1. Study design and patient population

This descriptive-analytical study was conducted from 2016 to 2017. The target population was adults with established RA or SLE who were referred to the hospital or private clinics of rheumatology of Birjand, South Khorasan province, eastern Iran. The inclusion criteria were: 1-age 18-75 years at enrollment. 2-established diagnosis of RA according to the 2010 ACR/EULAR classification criteria (13), or established diagnosis of SLE according to the 2012 SLICC criteria (14). 3-disease duration for more than 3 months. 4-willingness to participate in the study. The exclusion criteria were: 1-

subjects with end-stage renal disease requiring dialysis or transplantation. 2- pregnancy or breastfeeding. 3. Active malignancy.

3.2. Anthropometric measurements and operational definition

The demographic variables were obtained from the patients' files. Anthropometric measurements were obtained using standard methods. The patient's height was measured using a standard wall height meter, and the weight was recorded using an adult analog scale, which was placed on a firm, horizontal surface. Waist circumference was measured with a non-stretchable fiber measuring tape. A body mass index was calculated as weight (kg)/ height (m2).

The results of the biochemical test, including the lipid profile and fasting blood sugar (FBS), were extracted from the patient's file. Hyperlipidemia and diabetes were defined according to the international criteria (15, 16).

3.3. Blood pressure measurement

Patients were requested to be relaxed for 15 minutes. Then, blood pressure was measured using the right arm and repeated after 10 and 20 minutes (a total of three times). If taking the blood pressure from the right arm was not successful, the left arm was considered. The mean of the three measurements was recorded as the participant's final blood pressure.

3.4. Statistical analysis

Continuous data were described as mean ± standard deviation, while categorical data were described as percentages. The variables were compared using the Chi-Square and independent T-Test. All statistical analysis was performed using SPSS software, and a p-value <0.05 was considered statistically significant**.**

4.Result

A total of 274 patients were enrolled. Of these, 228 (83.2%) had RA and 46 (16.8%) had SLE. The majority of patients were female (92.7%). The mean age of patients with RA and SLE was 49.68 ± 10.8 and 36.5 ± 12.1 years, respectively.

The comparison of the variables between the groups is described in Table 1. There was a significant difference in waist circumference, with RA patients having a higher mean (92.5 ± 15.3 cm) compared to SLE patients (87.3 ± 12.8 cm) (p-value = 0.04). However, no significant differences were observed in terms of the other variables (p-value for all > 0.05).

Table 1. Descriptive statistics of the variables for the study participants.

Varibles	Rheumatoid Arthritis	Systemic Lupus Erythematosus	P-Value
	Mean±S.D	Mean±S.D	
Height	153.46 ± 11.10	151.20 ± 16.33	0.59
Weight	68.50 ± 14.30	64.40 ± 14.33	0.21
BMI	29.33 ± 6.58	26.90 ± 5.52	0.06
Waist Circumference	92.50 ± 15.30	87.30 ± 12.80	0.04
Fasting Blood Sugar	94.80 ± 30.50	88.90 ± 16.50	0.10
Cholesterol	187.40 ± 42.60	180.02 ± 39.70	0.31
Triglyceride	129.13 ± 62.90	120.41 ± 59.25	0.50
HDL	51.80 ± 16.60	47.90 ± 11.38	0.19
LDL	111.40 ± 33.97	105.58 ± 30.35	0.29
Systolic Blood Pressure	121.20 ± 18.10	117.00 ± 14.50	0.22
Diastolic Blood Pressure	76.60 ± 10.60	78.06 ± 12.60	0.53

Abbreviations: BMI: body mass index; HDL: high-density lipoprotein; LDL: low-density lipoprotein. S.D: Standard Deviation

The cardiovascular risk factors in patients with RA and SLE are depicted in Figure 1. The rate of abdominal obesity (86.60%) and dyslipidemia (80.50%) is higher in the SLE than in the RA patients. However, the prevalence of overweight and obesity (78.5%), hypertension (28.80%), diabetes (13.10%), heart disease (9.60%), and smoking (2.60%) was higher in the RA than the SLE patients.

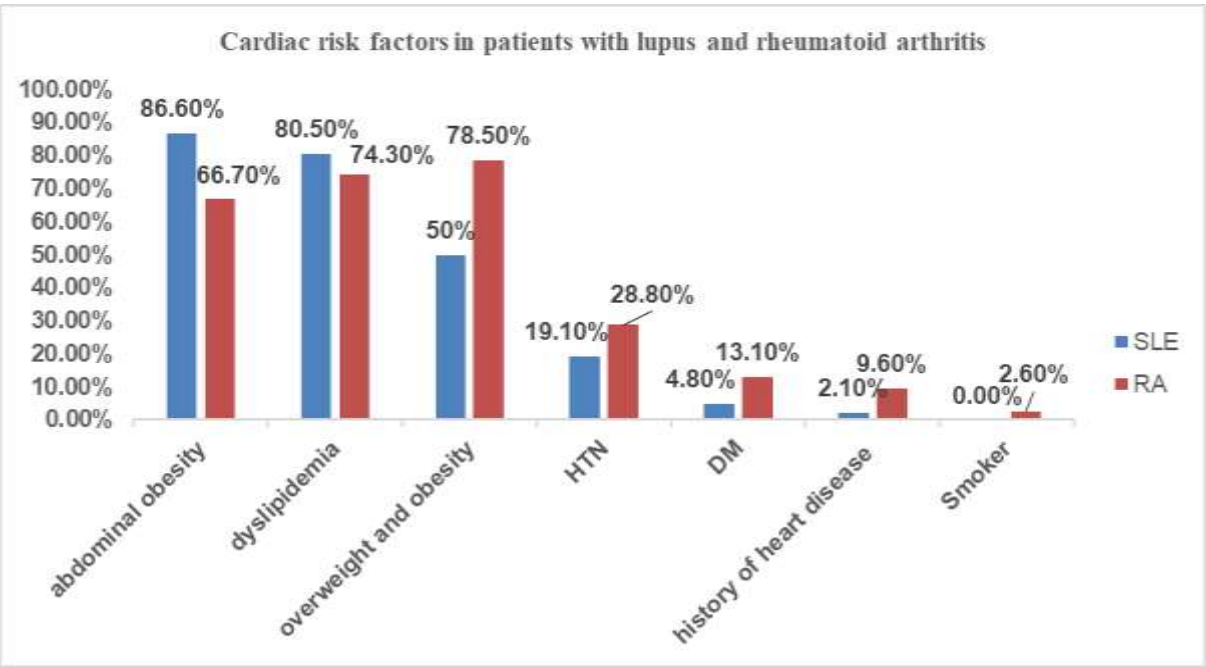

Figure 1. Cardiac risk factors in patients with lupus and rheumatoid arthritis.

5. Discussion

This study evaluated the cardiac risk factors in patients with RA and SLE who were referred to the hospital or the private clinics of rheumatology of Birjand. The findings indicated a high rate of overweight and obesity, dyslipidemia, and abdominal obesity in both groups. These results align with previous studies highlighting the significant cardiovascular risk in RA and SLE patients. Based on our results, in RA patients, the prevalence of overweight and obesity was 78.5%, dyslipidemia 74.3%, and abdominal obesity 66.7%. We also found that the waist circumference was significantly higher in the RA group than in the SLE group, which is comparable with the results of the other studies. The Danish cohort study by Linauskas et al. supports the association between higher waist circumference and increased risk of developing RA, particularly in women. The study reported that for each 5 cm increment in waist circumference, there was a 5% higher risk of developing RA in women (HR 1.05, 95% CI 1.01–1.10). Interestingly, the study highlighted that while abdominal obesity was a significant risk factor in women, no clear associations were observed in men, which contrasts with our findings that indicate a more pronounced role of waist circumference in both sexes. These differences could be attributed to variations in the study populations, measurement techniques, or the duration of follow-up. It suggests that future research should consider sex-specific factors and possibly utilize different anthropometric measures to understand better the risk of RA associated with abdominal obesity (17). A recent study by Wang et al. explored the association

between the Weight-Adjusted Waist Index (WWI) and the prevalence of RA in a large population-based sample. The study found a significant non-linear relationship between WWI and RA prevalence, with a positive association up to a certain threshold (WWI = 11.21 cm/√kg). Beyond this threshold, the association was not statistically significant, suggesting that while central obesity, as measured by WWI, contributes to RA risk, it may do so up to a specific point. This finding contrasts with our results, where a linear association between higher waist circumference and increased abdominal obesity in RA patients was observed. The ability of WWI to account for both lean mass and fat distribution provides a more nuanced understanding of obesity's role in RA, indicating the potential benefit of using more sophisticated obesity indices in future research to better assess cardiovascular and metabolic risks in RA patients (18).

According to our results, in SLE patients, abdominal obesity was observed in 86.6%, dyslipidemia in 80.5%, and overweight and obesity in 50%. The study by Calzza et al. yielded a slightly higher prevalence of abdominal obesity in SLE patients, with 76.8% of their population presenting this risk factor. It contrasts with our findings (86.6%), suggesting a variation that may be attributable to differences in the demographic and clinical characteristics of the study populations. Calzza et al. also highlighted the association of nutritional factors with increased cardiovascular risk, which further underscores the importance of comprehensive cardiovascular risk assessments in SLE patients, including detailed evaluations of dietary habits and anthropometric measures (19). Recent findings indicate that fiber intake may significantly influence waist circumference and abdominal obesity in patients with SLE. A study by Moreira et al. demonstrated that inadequate fiber consumption was associated with higher waist circumference and waist-to-height ratio in adolescents with SLE. Specifically, those with insufficient fiber intake had significantly higher waist circumferences (81.4 cm vs. 75.5 cm; $p = 0.02$) and waist-to-height ratios (0.51 vs. 0.47; $p = 0.02$). These results suggest that dietary factors, such as fiber intake, play a crucial role in modulating abdominal obesity in SLE patients. Our study's findings of a high prevalence of abdominal obesity in SLE patients may be partly explained by dietary patterns, including fiber consumption, which warrants further investigation to explore the potential benefits of dietary interventions in this population (20). The findings of Moreira et al. and our study highlight the significant impact of abdominal obesity in SLE patients, emphasizing the need for regular monitoring and targeted interventions to address this prevalent cardiovascular risk factor. These findings are consistent with prior research indicating a high prevalence of metabolic syndrome components in RA and SLE patients. Cardiovascular involvement in RA has been associated with a 35-50% lifetime risk of premature mortality and a subsequent 10-year reduction in life span. Additionally, RA and SLE patients are at a higher risk of out-of-hospital cardiac arrest due to increased incidences of ischemic heart disease and heart failure, as well as predisposition to cardiac arrhythmias (21).

The literature emphasizes that traditional cardiovascular risk factors alone do not fully explain the increased CVD risk in RA and SLE patients. Non-traditional factors, such as systemic inflammation, autoimmunity, and specific medication use, play significant roles (9). Chronic inflammation in RA and SLE contributes to the accelerated development of atherosclerosis, endothelial dysfunction, and increased arterial stiffness, all of which heighten the risk of CVD (22). The

comprehensive review by Sanghavi et al. underscores the importance of promptly identifying cardiac pathologies in RA patients to facilitate appropriate management and treatment (23). In SLE patients, cardiovascular risk is further compounded by disease-specific factors such as nephritis, the presence of antiphospholipid antibodies, and long-term glucocorticoid use. These factors contribute to a higher prevalence of hypertension, dyslipidemia, and diabetes in SLE patients compared to the general population (24), but no significant difference was found in our study.

An international audit of the management of dyslipidemia and hypertension in RA patients provides crucial insights into the geographical differences and management of CVD risk in RA patients. The study found considerable variations in estimated CVD risk and preventive treatment across different world regions. For instance, the use of lipid-lowering treatment (LLT) and antihypertensive treatment was significantly higher in North America compared to Central and Eastern Europe, where goal attainment for these treatments was lower. Despite the known increased CVD risk in RA patients, the audit revealed that only 44% of RA patients with an indication for LLT were actually receiving it, and among these, only 18% achieved the recommended LDL-c goals for those at very high risk (25). The authors also highlighted that approximately 62% of RA patients had hypertension, yet only about half achieved the BP goal, demonstrating a need for improved management of hypertension in RA patients. Furthermore, the audit emphasized the importance of collaboration between rheumatologists and cardiologists to optimize CVD risk management in RA patients. The findings from this international audit are consistent with our study, reinforcing the necessity for comprehensive cardiovascular assessments, personalized interventions, and collaborative care strategies to mitigate the heightened cardiovascular morbidity and mortality in RA and SLE patients (25).

Given these substantial risks, it is imperative to adopt a comprehensive approach to cardiovascular risk management in RA and SLE patients. Regular cardiovascular assessments, including advanced imaging techniques and biomarkers, are essential for early detection of subclinical atherosclerosis and accurate risk stratification. Personalized interventions, such as lifestyle modifications, pharmacological treatments, and tight control of disease activity, are crucial to mitigate cardiovascular morbidity and mortality in these patients. Furthermore, multidisciplinary care involving rheumatologists and cardiologists is essential to address the complex cardiovascular needs of RA and SLE patients.

Finally, in our study, no significant difference was found in the prevalence of cardiovascular risk factors, except for the risk factor of abdominal obesity (as measured by waist circumference). Abdominal obesity was more common in RA patients than in SLE patients. Overall, regular cardiovascular evaluations, personalized management strategies, and collaborative care are essential for addressing the increased cardiovascular risk in these populations. Further research is needed to optimize cardiovascular risk assessment tools and preventive measures tailored to RA and SLE patients.

6. Conclusion

The rate of cardiac risk factors in patients with RA and SLE is high, highlighting the need for regular monitoring and management to improve patient outcomes. These risk factors, including overweight, obesity, dyslipidemia, and abdominal obesity, necessitate a comprehensive approach to cardiovascular

care. Multidisciplinary care, including the cooperation of family doctors, rheumatologists, and cardiologists, is essential to improving lifestyle, reducing the risk of cardiovascular factors, preventing complications of heart disease, and ultimately reducing mortality in RA and SLE patients. Further research should focus on optimizing cardiovascular risk assessment tools and preventive measures explicitly tailored for RA and SLE patients. By implementing these strategies, we can significantly mitigate the cardiovascular morbidity and mortality associated with these chronic inflammatory diseases.

Acknowledgements: Authors of this study would like to thank "Birjand University of Medical Sciences, Birjand, Iran" and "Hospital Clinical Research Development Center" for consulting and cooperation. (Research plan code: IR.BUMS.REC.1398.191).

Availability of data and materials: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of interests: The authors declare that they have no conflicts of interest.

Consent for publication: Not applicable.

Ethics approval and consent to participate: All participants provided written informed consent before the study began. This study was conducted in accordance with ethical guidelines and was approved by the ethics committee, which assigned the code IR.BUMS.REC.1398.191. This study was conducted following the principles of the Declaration of Helsinki.

Financial disclosure: No financial support was received for this study.

Author contributions: Samaneh Moghimi Shahri performed conceptualization, data curation, investigation, methodology, validation, visualization, and writing – original draft, as well as writing – review and editing. Khadijeh Gholami performed conceptualization, data curation, investigation, methodology, validation, visualization, and writing – original draft. Toba Kazemi performed conceptualization, project administration, supervision, methodology, resources, validation, writing – original draft, writing – review and editing. Zohreh Nobakht performed investigation, resource gathering, validation, supervision, writing, review, and editing. Ehsan Afkar performed a formal analysis of software.

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