Cardiovascular Disease Prevalence and Risk in Rheumatoid Arthritis Patients: Insights from a Nationwide Thai Hospital Database

Natipoom Ketsing[1], Chingching Foocharoen[1], Siraphop Suwannaroj[1], Ajanee Mahakkanukrauh[1]

[1]Department of Medicine, Faculty of Medicine, Khon Kaen University, Khon Kaen, Thailand.

Abstract

Background: Rheumatoid Arthritis (RA) is a chronic inflammatory disease that can lead to cardiovascular system problems and complications. The prevalence of cardiovascular diseases (CVD) in RA patients in Thailand remains unclear.
Objectives: To determine whether patients with RA are at increased risk for cardiovascular disease and to assess the impact of atherosclerosis risk factors in RA.
Methods: A descriptive study used data from a nationwide In-patient healthcare database in Thailand. RA was identified using ICD-10 codes M05-M06. Cardiovascular diseases were defined as angina pectoris, acute myocardial infarction, subsequent myocardial infarction, certain current complications following acute myocardial infarction, and chronic ischemic heart disease. Atherosclerosis risk factors include diabetes mellitus (DM), hypertension (HT), and dyslipidemia (DLD). A total of 4,503 hospitalized RA patients between January 2014 and December 2021 were analyzed.
Results: The mean age of patients was 56 years, and 76% were female. The most prevalent cardiovascular diseases were chronic ischemic heart disease (2.27%) and acute myocardial infarction (0.33%). There was a significant increase in the prevalence of myocardial infarction (MI) in male patients under 65 with HT, DLD, and/or DM (OR 4.19, 95% CI 1.25-14.89), male patients over 65 with HT, DLD, and/or DM (OR 3.04, 95% CI 1.13-8.66), and female patients over 55 with HT, DLD, and/or DM (OR 2.85, 95% CI 1.67-5.02). However, no significant increase was found in female patients under 55 with HT, DLD, and/or DM (OR 3.14, 95% CI 0.72-13.77) compared to those with no risk factors.
Conclusions: Cardiovascular disease and atherosclerosis-related comorbidities are common among patients with rheumatoid arthritis. The presence of hypertension, dyslipidemia, and/or diabetes mellitus significantly increases the risk of cardiovascular disease in most subgroups, except in females under 55 years of age.

Keywords: Rheumatoid Arthritis, Cardiovascular disease, Atherosclerosis risk disease

To cite: Ketsing N., Foocharoen C., Suwannaroj S., Mahakkanukrauh A.
Thai J Rheum. 2025;2(2):1-6. Available from: https://he04.tci-thaijo.org/index.php/tjr

Introduction

Rheumatoid arthritis (RA) is a type of arthritis characterized by chronic inflammation of the synovial membrane (synovitis), which can also affect other organs in the body[1]. This inflammation leads to the destruction of cartilage, subchondral bone, and surrounding joint tissues, such as the bursa, ligaments, and tendons. Joint damage is the predominant feature of RA. In some cases, clinical features may indicate inflammation in other organs, manifesting as fever, fatigue, anemia, pericarditis, and vasculitis. Without appropriate and prompt treatment, RA can cause deformity, disability, and an increased risk of death. Early diagnosis and treatment[2], before permanent deformities (irreversible deformity) occur, are crucial strategies for preventing disability, improving the quality of life, and reducing the mortality rate in these patients.

Previous studies have found that RA is associated with statistically significant cardiovascular events[3–5]. Current treatment guidelines, in addition to focusing on managing RA, also recommend the prevention and care of cardiovascular disease[6]. Patients with RA are at increased risk for cardiovascular conditions, including myocardial ischemia, abnormal electrical conduction of the heart, ischemic stroke[7], and thromboembolism. These risks are exacerbated by treatments such as non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids[8], Disease Modifying Anti-Rheumatic Drugs (DMARDs)[9], Tumor Necrosis Factor (TNF) inhibitors, and Janus Kinase Inhibitors (JAKi)[10], all of which may have cardiovascular effects. Although several international studies have demonstrated an association between rheumatoid arthritis and cardiovascular disease, evidence from Thailand remains limited. Existing treatment guidelines emphasize the importance of managing cardiovascular comorbidities in rheumatoid arthritis; however, population-based data specific to the Thai context are lacking. Understanding the prevalence and risk factors of cardiovascular disease among Thai patients with rheumatoid arthritis is essential for guiding clinical decision-making and public health policy.

Therefore, this study aims to investigate the prevalence and associated risk factors of cardiovascular disease in hospitalized Thai patients with rheumatoid arthritis using a nationwide healthcare database. The findings will provide insight into the cardiovascular burden in this population and support the development of targeted prevention and management strategies.

Methods

This retrospective cross-sectional descriptive study utilized in-patient data from a nationwide Thailand healthcare database, including patients hospitalized between January 2014 and December 2021. The study was approved by the research ethics board at Khon Khen University Center.

Definitions

RA was identified using ICD-10 codes M05 and M06.
Cardiovascular diseases (CVDs) were classified into three categories:

1. Myocardial infarction (MI) was defined by ICD-10 codes I20 to I25.
2. Stroke was defined by ICD-10 codes G45, I63, and I69.
3. Peripheral arterial disease (PAD) was defined by ICD-10 code I74.

Atherosclerosis risk factors were classified into three categories:

1. Diabetes mellitus (DM) was defined by ICD-10 codes E10, E11, and E13.
2. Hypertension (HT) was defined by ICD-10 codes I10 and I15.
3. Dyslipidemia (DLD) was defined by ICD-10 code E78.

Outcomes: Our primary outcome was the prevalence of CVD in RA patients. A secondary outcome was the prevalence of atherosclerosis risk factors and the comparison of cardiovascular events in RA patients with or

without atherosclerosis risk factors, particularly in male patients 65 years of age and older and female patients 55 years of age and older, concerning myocardial infarction risk.

Statistical analysis: The descriptive statistics were used suitably. Qualitative variables were described by frequency and percentage. Quantitative variables were described by means and standard deviations. The correlation between cardiovascular disease and atherosclerosis risk disease was analyzed by Pearson correlation. A P-value of less than 0.05 was considered statistically significant. SPSS version 26 was used for all analyses in this study.

Results

A total of 4,503 hospitalized RA patients between January 2014 and December 2021 were included in the analysis. The demographic data of RA patients are summarized in Table 1. The mean age of patients was 56.36 years (SD 17.32), and 77.7% were female. Most participants did not have atherosclerosis risk factors. The association between patient characteristics and atherosclerotic risk is shown in Table 2, and the odds ratios of myocardial infarction in RA patients classified by age, gender, and atherosclerosis risk factors are shown in Table 3, which classifies male and female patients at cut points of 65 and 55 years, respectively.

The most prevalent cardiovascular diseases were chronic ischemic heart disease (2.27%) and acute myocardial infarction (0.33%). Among the 4,503 patients, 11.96% had diabetes mellitus, 30.8% had hypertension, and 11.2% had dyslipidemia.

The odds ratios for acute myocardial infarction among rheumatoid arthritis patients with atherosclerosis-related comorbidities—hypertension, diabetes mellitus, and/or dyslipidemia—are summarized in Table 3.

Table 1 Demographic Data of RA Patients

Data	Rheumatoid arthritis **(N =4,503)**
Gender	
● Male	1004 (22.30)
● Female	3499 (77.70)
Age (years)	
● 20-30	114 (2.53)
● 30-40	140 (3.11)
● 40-50	418 (9.28)
● 50-60	1237 (27.47)
● > 60	2594 (57.61)
Atherosclerosis risk	
● Diabetic mellitus	539 (11.97)
● Hypertension	1387 (30.80)
● Dyslipidemia	504 (11.19)
Cardiovascular disease	
● Angina pectoris	4 (0.09)
● Acute myocardial infarction	15(0.33)
● Subsequent myocardial infarction	1 (0.02)
● Certain current complications following acute myocardial infarction	1 (0.02)
● Other acute ischemic heart diseases	0 (0.00)
● Chronic ischemic heart disease	102 (2.27)
● Stroke	0 (0.00)
● PAD	0 (0.00)

Table2 Cardiovascular Disease Prevalence in RA Patients with Different Atherosclerosis Risk Factors

Data	Diabetic Mellitus (N= 539)	Hypertension (N= 1387)	Dyslipidemia (N= 504)	No Risk (N= 2,816)
Gender				
● Male	74 (13.73)	250 (18.02)	74 (14.68)	709 (25.18)
● Female	465 (86.27)	1137 (81.98)	480 (85.32)	2107 (74.82)
Age (years)				
● 20-30	0 (0)	3 (0.22)	1 (0.20)	7 (0.25)
● 30-40	3 (0.56)	12 (0.87)	1 (0.20)	2507 (89.03)
● 40-50	32 (5.94)	68 (4.90)	18 (3.57)	180 (6.39)
● 50-60	163 (30.24)	326 (23.50)	130 (25.79)	7 (0.25)
● > 60	341 (63.27)	978 (70.51)	354 (70.24)	115 (4.08)
Cardiovascular disease				
● Angina pectoris	0	2 (0.14)	1 (0.20)	2 (0.07)
● Acute myocardial infarction	3 (0.56)	6 (0.43)	5 (0.99)	7 (0.25)
● Subsequent myocardial infarction	0 (0)	1 (0.07)	0	0
● Certain current complications following acute myocardial infarction	0	0	0	1 (0.04)
● Chronic ischemic heart disease	20 (3.71)	57 (4.11)	31 (6.15)	35 (1.24)

Table 3 Odd Ratio of Myocardial Infarction in RA Patients by Age, Gender, and Atherosclerosis Risk Factors

			MI	No MI	OR (95%CI)	P-Value
Male	Age ≤ 65	HT/DM/DLD	8	143	4.19 (1.25-14.89)	0.005
		No CVD risk	6	450		
	Age > 65	HT/DM/DLD	13	131	3.04 (1.13-8.66)	0.01
		No CVD risk	8	245		
Female	Age ≤ 55	HT/DM/DLD	5	249	3.14 (0.72-13.77)	0.06
		No CVD risk	5	783		
	Age > 55	HT/DM/DLD	50	1086	2.85 (1.67-5.02)	<0.001
		No CVD risk	21	1298		

Discussion

Rheumatoid arthritis is a chronic inflammatory disease that is increasingly recognized as a contributor to cardiovascular morbidity[11]. In this study, we utilized a nationwide Thai healthcare database of hospitalized patients to investigate the relationship between rheumatoid arthritis and cardiovascular disease. Our findings revealed that the most common cardiovascular conditions among hospitalized patients with rheumatoid arthritis were chronic ischemic heart disease (2.27%) and acute myocardial infarction (0.33%).

In comparison to the general Thai population reported in the NHES 2019 survey[12], the prevalence of diabetes mellitus (11.96%) and hypertension (30.8%) was higher among hospitalized RA patients in our cohort. Interestingly, the prevalence of dyslipidemia was lower (11.2% vs. 43.8%), possibly due to underdocumentation in inpatient settings or prior treatment with lipid-lowering agents. These differences highlight the need for integrated cardiovascular risk management in RA patients. RA patients showed an increase in the prevalence of cardiovascular diseases. Specifically, there was a significant increase in the prevalence of myocardial infarction (MI) in:

Male patients under 65 years with hypertension (HT), dyslipidemia (DLD), and/or diabetes mellitus (DM) (OR 4.19, 95% CI 1.25-14.89, p-value 0.005).

Male patients over 65 years with HT, DLD, and/or DM (OR 3.04, 95% CI 1.13-8.66, p-value 0.01).
Female patients over 55 years with HT, DLD, and/or DM (OR 2.85, 95% CI 1.67-5.02, p-value <0.001). However, there was no significant increase in the prevalence of MI in female patients under 55 years with HT, DLD, and/or DM (OR 3.14, 95% CI 0.72-13.77, p-value 0.06) compared to those with no risk factors.
Our results provide compelling evidence that rheumatoid arthritis patients with atherosclerosis-related risk factors, such as hypertension, dyslipidemia, and diabetes mellitus, have a significantly increased risk of developing cardiovascular disease. This supports previous research indicating that systemic inflammation in rheumatoid arthritis may contribute to endothelial dysfunction and accelerate atherosclerosis[13]. These mechanisms highlight the role of chronic inflammation in driving cardiovascular risk in this patient population.

Our findings underscore the importance of early diagnosis and comprehensive management—not only of rheumatoid arthritis itself but also of coexisting cardiovascular risk factors. Clinicians should be vigilant in screening for and controlling hypertension, diabetes, and dyslipidemia in patients with rheumatoid arthritis to reduce cardiovascular complications.
A key strength of this study lies in its use of a nationwide healthcare database, which provides a large and representative sample of hospitalized rheumatoid arthritis patients across Thailand. This facilitates a robust assessment of cardiovascular disease prevalence and its associated risk factors in a real-world clinical setting.

However, several limitations must be acknowledged. First, the database lacked information on key lifestyle-related cardiovascular risk factors, such as smoking status, alcohol consumption, dietary habits, and physical activity, which may confound the observed associations. Second, data regarding disease severity and treatment regimens for rheumatoid arthritis were not available, which limits our ability to evaluate their influence on cardiovascular outcomes. Third, our analysis was restricted to inpatient data and excluded patients managed exclusively in outpatient settings. As a result, the true prevalence and burden of cardiovascular disease in the broader rheumatoid arthritis population may be underestimated.

Conclusions

Cardiovascular disease and atherosclerosis-related comorbidities are common among patients with rheumatoid arthritis. The presence of hypertension, dyslipidemia, and/or diabetes mellitus significantly increases the risk of cardiovascular disease in most subgroups, except in females under 55 years of age.

Reference

1. Smolen JS, Aletaha D, McInnes IB. Rheumatoid arthritis. The Lancet. 2016;388(10055):2023–2038. doi:10.1016/S0140-6736(16)30173-8.
2. Singh JA, Saag KG, Bridges SL Jr, Akl EA, Bannuru RR, Sullivan MC, et al. 2021 American College of Rheumatology Guideline for the Treatment of Rheumatoid Arthritis. Arthritis Rheumatol. 2021;73(7):1108–1123. doi:10.1002/art.41752.
3. Aviña-Zubieta JA, Choi HK, Sadatsafavi M, et al. Risk of cardiovascular mortality in patients with rheumatoid arthritis: a meta-analysis of observational studies. Arthritis Rheum 2008; 59:1690.
4. Kremers HM, Crowson CS, Therneau TM, et al. High ten-year risk of cardiovascular disease in newly diagnosed rheumatoid arthritis patients: a population-based cohort study. Arthritis Rheum 2008; 58:2268.
5. Maradit-Kremers H, Crowson CS, Nicola PJ, et al. Increased unrecognized coronary heart disease and sudden deaths in rheumatoid arthritis: a population-based cohort study. Arthritis Rheum 2005; 52:402.
6. Agca R, Heslinga SC, Rollefstad S, et al. EULAR recommendations for cardiovascular disease risk management in patients with rheumatoid arthritis and other forms of inflammatory joint disorders: 2015/2016 update. Ann Rheum Dis. 2017;76(1):17-28. doi:10.1136/annrheumdis-2016-209775.
7. Al-Ewaidat OA, Naffaa MM. Stroke risk in rheumatoid arthritis patients: exploring connections and implications for patient care. Clin Exp Med. 2024;24(1):30. doi:10.1007/s10238-023-01288-7. PMID: 38294723; PMCID: PMC10830780.
8. Johri N, Varshney S, Gandha S, Maurya A, Mittal P, Jangra S, et al. Association of cardiovascular risks in rheumatoid arthritis patients: management, treatment and future perspectives. Health Sci Rev. 2023;8:100108. doi:10.1016/j.hsr.2023.100108. Available from: https://www.sciencedirect.com/science/article/pii/S277263202300034X.
9. Ahn SM, Kim S, Kim YJ, Hong S, Lee CK, Yoo B, et al. Risk of acute myocardial infarction associated with anti-rheumatic agents in patients with rheumatoid arthritis: a nationwide population-based case-control study. J Rheum Dis. 2025;32(2):113–121. doi:10.4078/jrd.2024.0104. PMID: 40134550; PMCID: PMC11931272.
10. Meissner Y, Schäfer M, Albrecht K, Kekow J, Zinke S, Tony HP, et al. Risk of major adverse cardiovascular events in patients with rheumatoid arthritis treated with conventional synthetic, biologic and targeted synthetic disease-modifying antirheumatic drugs: observational data from the German RABBIT register. RMD Open. 2023;9(4):e003489. doi:10.1136/rmdopen-2023-003489. PMID: 37880180; PMCID: PMC10603345.
11. Solomon DH, Karlson EW, Rimm EB, et al. Cardiovascular morbidity and mortality in women diagnosed with rheumatoid arthritis. Circulation. 2003;107(9):1303-7.
12. Bureau of Non-Communicable Diseases, Department of Disease Control. Situation report on NCDs: diabetes, hypertension, and related risk factors, 2019. Nonthaburi: Aksorn Graphic and Design Publishing, 2020.
13. Yang X, Chang Y, Wei W. Endothelial dysfunction and inflammation: immunity in rheumatoid arthritis. Mediators Inflamm. 2016;2016:6813016. doi:10.1155/2016/6813016. PMID: 27122657; PMCID: PMC4829719.