ORIGINAL RESEARCH PAPER

Medicine

PREVALENCE AND CLINICAL CORRELATES OF HYPERTENSION IN SEROPOSITIVE RHEUMATOID ARTHRITIS PATIENTS: A HOSPITAL-BASED CROSS-SECTIONAL STUDY IN RAJASTHAN

KEY WORDS: Rheumatoid Arthritis, Hypertension, Anti-CCP, CRP, ESR, Inflammation

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ABSTRACT

Background: Rheumatoid arthritis (RA), a chronic autoimmune condition, is increasingly associated with cardiovascular comorbidities, particularly hypertension. Systemic inflammation in RA, combined with treatment regimens and metabolic risk factors, contributes to elevated blood pressure. **Objectives:** To assess the prevalence of hypertension in seropositive RA patients and evaluate associations with inflammatory markers like anti-CCP, ESR, and CRP. **Methods:** A cross-sectional study was conducted over 18 months at a tertiary care hospital in Rajasthan involving 100 seropositive RA patients. Demographic, clinical, and laboratory data were collected. Hypertension was defined as SBP ≥140 mmHg and/or DBP ≥90 mmHg, as per JNC 8 classification. Statistical analyses were performed using SPSS 25. **Results:** Hypertension was found in 31% of participants. A statistically significant association was noted between hypertension and elevated anti-CCP (>20 U/ml), ESR (>20 mm/hr), and CRP (>5 mg/l) ($p < 0.05$). Prevalence was higher among older patients and slightly more common in females. **Conclusion:** The high prevalence of hypertension among seropositive RA patients underscores the need for integrated cardiovascular screening and inflammation control. Routine monitoring of inflammatory markers can aid in early identification of patients at higher risk for hypertension.

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic, systemic autoimmune disorder that primarily targets the synovial joints, resulting in progressive joint destruction, pain, stiffness, and functional disability. Affecting approximately 1% of the adult population worldwide, RA is associated with significant morbidity and reduced quality of life. However, RA extends far beyond the musculoskeletal system. It is now well-established that RA patients are at an increased risk of various extra-articular complications, particularly cardiovascular disease (CVD), which is the leading cause of premature mortality in this population.

Among the spectrum of cardiovascular comorbidities, hypertension (HTN) stands out as one of the most prevalent and modifiable risk factors. Hypertension not only contributes to atherosclerosis and heart failure but also acts synergistically with systemic inflammation to amplify vascular damage. This has led to a growing body of research investigating the link between RA and elevated blood pressure.

The mechanisms underlying this association are multifactorial. Chronic systemic inflammation—a hallmark of RA—drives endothelial dysfunction, oxidative stress, and arterial stiffness through the release of pro-inflammatory cytokines such as tumor necrosis factor-alpha (TNF-), interleukin-6 (IL-6), and C-reactive protein (CRP). These inflammatory mediators promote vasoconstriction, increase vascular resistance, and accelerate the development of hypertension. Furthermore, commonly used medications in RA management, including non-steroidal anti-inflammatory drugs (NSAIDs) and corticosteroids, are known to influence blood pressure via fluid retention, altered renal function, and sympathetic activation.

Additionally, lifestyle factors such as physical inactivity due to joint pain, increased incidence of metabolic syndrome, and obesity further elevate hypertension risk in RA patients. Social determinants—including age, female sex, socioeconomic status, and smoking—compound this vulnerability.

Despite this well-documented interplay, hypertension remains underdiagnosed and under-managed in many patients with RA. Overlapping symptoms such as fatigue and malaise may obscure its early detection, while the clinical focus often remains restricted to joint management. This oversight can result in missed opportunities for cardiovascular risk reduction and leads to suboptimal outcomes.

Given these concerns, there is a pressing need for routine cardiovascular assessment in RA patients, particularly those with active inflammation and high-risk profiles. Understanding the association between inflammatory biomarkers and hypertension could enable clinicians to stratify risk more accurately and intervene early.

This study was undertaken to evaluate the prevalence of hypertension among seropositive RA patients in a tertiary care hospital in Rajasthan, India, and to examine its association with key inflammatory markers, including anti-cyclic citrullinated peptide (anti-CCP), ESR, and CRP. By identifying relevant correlations and demographic patterns, this research aims to support a more holistic, inflammation-aware approach to hypertension screening and cardiovascular risk reduction in RA patients.

MATERIALS AND METHODS

Study Design And Setting:

A hospital-based cross-sectional study was carried out over 18 months in the Department of General Medicine at Pacific Institute of Medical Sciences, Udaipur, Rajasthan.

Sample Size And Sampling:

Convenience sampling was used to recruit 100 seropositive RA patients aged >18 years.

Inclusion Criteria:

- Diagnosed seropositive RA patients
- Age above 18 years
- Informed consent

Exclusion Criteria:

- Seronegative RA
- Prior history of hypertension before RA diagnosis
- Co-morbidities like diabetes, stroke, or thyroid disorders

- Known addictions

Data Collection:
Patients were evaluated using a structured proforma. Clinical history, physical examination, and laboratory tests were conducted. Blood pressure was measured using a sphygmomanometer with an average of four readings taken in a relaxed supine position.

Investigations Included:
- RA factor
- Anti-CCP
- ESR
- CRP
- CBC, RFT, LFT, Lipid profile
- ECG, 2D Echo, Fundus exam

Statistical Analysis:
SPSS version 25 was used. Mean and standard deviation were calculated for continuous variables, while categorical data were analyzed using Chi-square tests. $p < 0.05$ was considered statistically significant.

RESULTS

Demographic Profile
Of the 100 RA patients, 73% were female and 27% male. The mean age was 46.57 ± 12.96 years. The largest group (38%) was aged 31–45 years.

Prevalence Of Hypertension
Hypertension was identified in 31% of patients. Its prevalence increased with age: 12.5% in patients aged 18–30 years to 45.8% in those >60 years.

Anti-CCP and Hypertension
- 68% had anti-CCP >20 U/ml.
- Among hypertensive patients, 83.9% had high anti-CCP levels.
- The association was statistically significant (p = 0.02).

ESR And Hypertension
- 55% had ESR >20 mm/hr.
- Among hypertensives, 71% had elevated ESR.
- The association was statistically significant (p = 0.03).

CRP and Hypertension
- 60% had CRP >5 mg/L.
- Among hypertensives, 77.4% had high CRP.
- The association was statistically significant (p = 0.01).

Gender Association
- Hypertension prevalence: 29.6% in males vs. 31.5% in females.

Table 1: Demographic Characteristics Of Study Participants

Characteristic	Category	Frequency (%)
Gender	Male	27
	Female	73
Age Group	18–30	9
	31–45	38
	46–60	29
	>60	24

Mean Age: 46.57 ± 12.96 years

Figure 1: Age Distribution

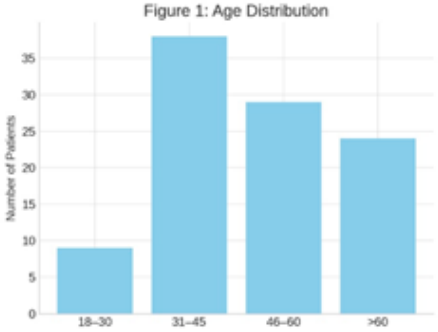


Table 2: Prevalence Of Hypertension

Hypertension Status	Frequency (n)	Percentage (%)
Present	31	31%
Absent	69	69%

Figure 2: Hypertension Prevalence

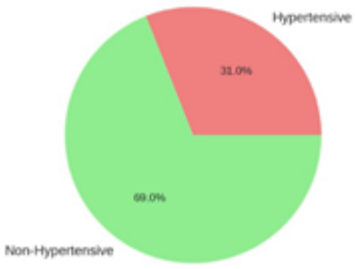


Table 3: Association Of Inflammatory Markers With Hypertension

Marker	Level	Hypertensive (%)	p-value	Significance
Anti-CCP	> 20 U/ml	38.2%	0.02	Statistically significant
ESR	> 20 mm/hr	40.0%	0.03	Statistically significant
CRP	> 5 mg/l	40.0%	0.01	Statistically significant

Table 4: Age-wise Distribution Of Hypertension

Age Group	Hypertensive (n)	Total in Group (n)	Prevalence (%)
18–30 years	1	9	11.1%
31–45 years	11	38	28.9%
46–60 years	8	29	27.6%
>60 years	11	24	45.8%

Figure 3: Anti-CCP and Hypertension

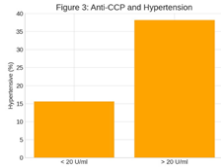


Figure 4: ESR and Hypertension

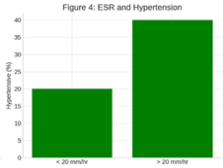
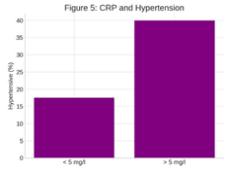


Figure 5: CRP and Hypertension



DISCUSSION

The present study showed a hypertension prevalence of 31% among seropositive RA patients, consistent with international studies ranging from 26–44% (e.g., Al-Ahmari et al., Bajraktari et al.).

Gender And Age:
While females constituted the majority (73%), hypertension was similarly prevalent among males (29.6%) and females (31.5%). The age-related increase in hypertension (from

11.1% in 18–30 years to 45.8% in >60 years) mirrors established trends in cardiovascular epidemiology.

Inflammatory Markers:

Significant associations were found between hypertension and anti-CCP, ESR, and CRP, underscoring the role of chronic inflammation. Elevated anti-CCP antibodies, a hallmark of RA, were present in 83.9% of hypertensive cases. Similar findings have been reported by Bajraktari et al., linking elevated anti-CCP levels with increased cardiovascular risk. Raised ESR and CRP also point to the systemic inflammatory burden contributing to vascular stiffness and endothelial dysfunction.

These findings affirm the hypothesis that systemic inflammation in RA is intricately linked to hypertension, emphasizing the need for inflammatory control in mitigating cardiovascular risk.

CONCLUSION

This study highlights the significant burden of hypertension among seropositive rheumatoid arthritis (RA) patients, with a prevalence rate of 31%. The findings reinforce the emerging understanding that RA is not solely a joint-related disorder but a systemic inflammatory disease with substantial cardiovascular implications. Elevated levels of inflammatory markers—specifically anti-cyclic citrullinated peptide (anti-CCP) antibodies, erythrocyte sedimentation rate (ESR), and C-reactive protein (CRP)—were found to be significantly associated with the presence of hypertension, suggesting a strong link between systemic inflammation and vascular dysfunction in RA.

The results indicate that chronic inflammation may contribute to endothelial damage, arterial stiffness, and metabolic dysregulation, all of which elevate cardiovascular risk. Additionally, the study observed that older age further exacerbates the likelihood of developing hypertension, emphasizing the need for age-specific and risk-adjusted screening protocols in RA care.

These findings underscore the importance of integrating cardiovascular risk management into routine RA care. Rheumatologists and primary care physicians must collaborate closely to ensure that RA patients are regularly monitored not only for joint disease activity but also for cardiovascular parameters such as blood pressure. Early identification and control of hypertension in this high-risk population can play a pivotal role in preventing long-term cardiovascular complications, improving quality of life, and reducing overall morbidity and mortality.

In conclusion, this study advocates for a paradigm shift in the management of RA—one that recognizes and proactively addresses the cardiovascular risks associated with systemic inflammation. Future longitudinal and multi-center studies are needed to further elucidate causal pathways and to develop targeted intervention strategies for mitigating hypertension and improving cardiovascular outcomes in RA patients.

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