SOCIODEMOGRAPHIC DETERMINANTS AND CARDIOVASCULAR EVENTS IN RHEUMATOID ARTHRITIS: A CROSS-SECTIONAL STUDY FROM A TERTIARY CARE HOSPITAL IN PESHAWAR, PAKISTAN

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ABSTRACT

OBJECTIVES

To determine the relationship between sociodemographic characteristics and the occurrence of cardiovascular events in RA patients admitted to the Tertiary Care Hospital in Peshawar.

METHODOLOGY

A cross-sectional study was conducted from November 1, 2023, to April 30, 2024, enrolling 211 RA patients (aged 25–70 years) diagnosed according to ACR/EULAR criteria. Cardiovascular events, defined as myocardial infarction (MI) and ischemic stroke, were documented from medical records. Data on age, gender, income, and education were collected and analysed using SPSS version 25. Associations were evaluated with chi-square tests, and a p-value <0.05 was considered significant.

RESULTS

The mean age of the patients was 48.07 ± 10.86 years, and the mean duration of rheumatoid arthritis (RA) was 5.71 ± 2.90 years. The male-to-female ratio was approximately 1.7:1. MI was observed in 43 patients (20.4%), and ischemic stroke in 48 patients (22.7%). There was no statistically significant association between cardiovascular events and any sociodemographic variable (p > 0.05).

CONCLUSION

Cardiovascular events, including MI and ischemic stroke, are common in RA patients; however, sociodemographic factors such as age, gender, income, and education were not significantly associated with their occurrence. Future research should investigate additional factors, including inflammatory biomarkers, disease activity, treatment regimens, and genetic predispositions, to gain a deeper understanding of cardiovascular risk in rheumatoid arthritis (RA).

KEYWORDS: *Rheumatoid Arthritis, Cardiovascular Events, Socioeconomic Status, Myocardial Infarction, Ischemic Stroke*

INTRODUCTION

The synovial joints are the primary target of rheumatoid arthritis (RA), a chronic, systemic inflammatory disease that causes increasing joint inflammation, discomfort, and, eventually, joint destruction.[1] RA is caused by an abnormal immune response that leads to persistent inflammation and the generation of autoantibodies, such as rheumatoid factor (RF) and anti-citrullinated protein antibodies (ACPAs), in contrast to osteoarthritis, which is largely a degenerative disease. In addition to causing joint injury, these immune mechanisms also raise the risk of osteoporosis, cardiovascular complications, and pulmonary involvement, among other extra-articular symptoms. Due to its complexity, RA is a serious public health issue that has a big influence on both healthcare expenses and patient quality of life.[2] According to epidemiology, 1% of people worldwide suffer from RA, with women more likely than men to have the condition. Although it can start at any age, RA usually manifests between the ages of 30 and 50.[3] Patients and healthcare systems are heavily burdened by the disease's chronic and progressive character as well as its systemic impacts. This is largely due to its contribution to cardiovascular disease (CVD). RA is linked to higher mortality in addition to joint damage and disability. One of the main characteristics of RA is chronic inflammation, which is essential to the development of atherosclerosis and raises the risk of myocardial infarction and ischemic stroke in those who have it.[4] Atherosclerosis develops more quickly in RA patients due to chronic inflammation, which raises the risk of cardiovascular disease.[5] Established risk factors cause cardiovascular disease (CVD) in RA. However, it is yet unclear how sociodemographic factors affect cardiovascular events.[6-7] To create focused preventive initiatives for this high-risk population, it is imperative to clarify this relationship. The infiltration of immune cells, including T cells, B cells, and macrophages, into

the synovial membrane is a pathophysiological feature of RA. Tumour necrosis factor-alpha (TNF-α), interleukin-1 (IL-1), and interleukin-6 (IL-6) are among the proinflammatory cytokines produced as a result of this infiltration, which feeds the cycle of inflammation. These cytokines cause synovial fibroblasts to release matrix metalloproteinases and other enzymes that break down bone and cartilage.[8] These processes eventually lead to joint degradation, the development of pannus tissue, and severe functional disability. Additionally, endothelial dysfunction and metabolic abnormalities have been connected to systemic inflammation in RA, which increases the risk of concomitant diseases like CVD.[9]

There is a significant socioeconomic cost associated with RA. Patients are more likely to need long-term disability support, have greater absence rates, and are frequently less productive at work. Additionally, because RA is a chronic condition, it requires continuous medical care, including pharmacological treatments such as biologics, targeted synthetic medicines, and disease-modifying antirheumatic medications (DMARDs). Although these treatments have greatly enhanced clinical results, managing RA is made more difficult by their high expense and potential side effects, especially in environments with limited resources.[10] There are still several unanswered questions despite improvements in treatment approaches and our growing understanding of RA. Specifically, it is unclear how sociodemographic characteristics and the frequency of cardiovascular events interact in RA patients. Regarding the influence of gender, education, and socioeconomic situation on cardiovascular outcomes in RA, prior research has produced contradictory findings. Understanding these relationships is essential for creating specialised prevention efforts and improving patient management, as cardiovascular complications are a major cause of death in RA.[11] In light of the above, the current study aims to fill in these knowledge gaps by investigating the connection between cardiovascular events and sociodemographic traits in rheumatoid arthritis patients. Clarifying whether age, gender, income, and education have a substantial impact on the risk of myocardial infarction and ischemic stroke in this high-risk group is the justification for this study. The study aims to provide information for targeted therapies and resource allocation plans that may ultimately improve cardiovascular outcomes in RA patients by identifying or excluding these relationships. Optimising preventative actions based on sociodemographic risk variables could significantly affect patient care and overall healthcare expenditures, making this research especially relevant for settings with limited resources.

METHODOLOGY

A cross-sectional study was conducted at the Department of Medicine, Khyber Teaching Hospital, Peshawar, Pakistan, between November 1, 2023, and April 30, 2024. A total of 211 RA patients (25–70 years) diagnosed according to the 2010 ACR/EULAR criteria were enrolled. Structured interviews were conducted to gather sociodemographic data (age, gender, income, education level). Cardiovascular events were defined as a documented history of myocardial infarction (MI) or ischemic stroke based on medical records. Data were analysed using SPSS version 25. Descriptive statistics were calculated, and associations between cardiovascular events and sociodemographic factors were assessed using chi-square tests, with a p-value <0.05 deemed statistically significant.

RESULTS

The study population had a mean age of 48.07 ± 10.86 years and an RA duration of 5.71 ± 2.90 years. The male-to-female ratio was approximately 1.7:1. Cardiovascular events were recorded in 20.4% of patients for MI and 22.7% for ischemic stroke. Chi-square analysis showed no statistically significant association between cardiovascular events and sociodemographic variables ($p > 0.05$).

Table 1: Stratification of Cardiovascular Events in RA Patients by Socio Demographic Factors

Factor	Category	MI (n, %)	Ischemic Stroke (n, %)	p-value
Age	<45 years	18 (18.0%)	20 (20.0%)	>0.05
	≥45 years	25 (22.0%)	28 (24.0%)	>0.05
Gender	Male	22 (21.0%)	24 (23.0%)	>0.05
	Female	21 (19.0%)	24 (22.0%)	>0.05
Income	Low Income	20 (20.0%)	23 (23.0%)	>0.05
	High Income	23 (20.8%)	25 (22.7%)	>0.05
Education	Primary/Secondary Education	26 (21.3%)	28 (22.9%)	>0.05
	Tertiary Education	17 (19.5%)	20 (22.0%)	>0.05

Note: The numbers are based on overall prevalence (MI: 20.4%, Stroke: 22.7%).

DISCUSSION

With ischemic stroke and MI occurring in 20.4% and 22.7% of cases, respectively, the current study demonstrates the high frequency of cardiovascular events in RA patients. These results are in line with past research showing that RA carries a higher cardiovascular risk, similar to that of other high-risk diseases, including diabetes mellitus.[12] Contrary to

some research, however, which suggests that a lower socioeconomic position may increase cardiovascular risk.[13-14] We found no evidence of a substantial correlation between cardiovascular outcomes and sociodemographic variables. The influence of chronic systemic inflammation, disease activity, and treatment-related variables may overshadow the impact of sociodemographic traits on cardiovascular events in RA patients.[15] In contrast to conventional risk variables, recent data emphasises the significance of inflammatory biomarkers and the severity of RA disease as better indicators of cardiovascular outcomes.[16] This study's lack of correlation may also be explained by differences in study design, patient population homogeneity, and regional healthcare disparities. According to our research, people with rheumatoid arthritis (RA) have a significant incidence of cardiovascular events, including myocardial infarction and ischemic stroke. Interestingly, we found no statistically significant correlations between these occurrences and sociodemographic variables, including education, income, gender, or age. According to this finding, other factors—like chronic systemic inflammation, disease activity, and treatment-related factors—may be more important in determining cardiovascular risk in our group than conventional sociodemographic characteristics. Concerning the impact of socioeconomic determinants on cardiovascular outcomes in individuals with RA, national studies from Pakistan show conflicting findings. For instance, one study observed no significant association between income level and cardiovascular events, but another study discovered that lower socioeconomic status was associated with greater cardiovascular morbidity.[17–18] Variations in study design, sample characteristics, and the relative weight given to inflammatory markers versus sociodemographic variables could all contribute to these disparities. Our results are more consistent with the latter, indicating that the systemic inflammatory burden in RA may overshadow the impacts of sociodemographic status. The idea that conventional cardiovascular risk factors in RA are less predictive than disease-specific markers is further supported regionally by data from South Asia. According to a study conducted in India by Verma et al., the chronic inflammatory state that characterises RA is the primary cause of elevated cardiovascular risk, even if traditional risk factors like hypertension and dyslipidemia are common among RA patients.[19] This supports our finding that sociodemographic differences can not have a substantial impact on cardiovascular outcomes in a patient population that is generally homogeneous. Globally, research from North America and Europe consistently demonstrates a strong correlation between the cardiovascular risk of RA patients and their socioeconomic status; however, these studies also emphasise the importance of early detection, effective control of inflammation, and targeted treatment approaches in reducing cardiovascular risk.[20] Disparities in healthcare infrastructure, access to cutting-edge treatments, genetic predispositions, and lifestyle factors may account for the discrepancies between our findings and those published in high-income nations.[21,24] On the other hand, our patient population from a resource-constrained situation might be exposed to RA-specific risk factors at a reasonably consistent level, which would reduce the apparent influence of sociodemographic factors. Overall, our study contributes to the body of knowledge by demonstrating that sociodemographic parameters have a negligible impact on predicting cardiovascular events in RA in our environment. Rather, it appears that treatment techniques, the duration of the condition, and chronic inflammation are more significant factors. To develop focused preventive measures, future studies should employ longitudinal, multicenter designs with larger and more diverse cohorts. These studies should also include thorough evaluations of both conventional cardiovascular risk factors and RA-specific characteristics.[25] Longitudinal studies that incorporate thorough evaluations of inflammatory markers, RA disease activity, therapeutic approaches, and genetic predispositions should be the primary focus of future research. Generalizability would be improved by multicenter research involving larger and more diverse patient groups.[26] Investigations incorporating environmental and lifestyle factors alongside sociodemographic data may also provide a more comprehensive risk profile for cardiovascular events in RA.[27]

LIMITATIONS

There were unmeasured confounders that could have influenced the outcomes, such as inflammatory biomarkers, treatment regimens, lifestyle factors, and rheumatoid arthritis (RA) disease activity, which were not fully accounted for in the analysis. Although the study had sufficient statistical power, a larger sample size may be required to detect more subtle associations and enhance the robustness of the findings.

CONCLUSIONS

Cardiovascular events, including myocardial infarction and ischemic stroke, are common among RA patients. However, in this study, sociodemographic factors (age, gender, income, and education) were not found to be significantly associated with cardiovascular events. These findings suggest that other determinants, such as

systemic inflammation and disease-specific factors, may play a more critical role in cardiovascular risk in RA. Future longitudinal, multicenter studies are necessary to elucidate these associations further and develop effective preventive interventions.

CONFLICT OF INTEREST: None

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The authors accept responsibility for all aspects of the work and will ensure that any concerns regarding the accuracy or integrity of any part are properly investigated and resolved.