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Original Research Article

Proportion of chronic kidney disease in rheumatoid arthritis patients, in a tertiary level hospital

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ABSTRACT

Background: Chronic kidney disease (CKD) is a significant but often overlooked complication in rheumatoid arthritis (RA) patients, influenced by systemic inflammation, medication-induced nephrotoxicity, and comorbidities such as hypertension and anemia. The purpose of this study was to determine the proportion of chronic kidney disease among rheumatoid arthritis patients in a tertiary-level hospital. The aim of the study was to determine the proportion of chronic kidney disease among rheumatoid arthritis patients in a tertiary level hospital.
Methods: This cross-sectional study at the Department of Medicine, Sir Salimullah Medical College and Mitford Hospital, Dhaka (January to December 2015), included 50 RA patients (2010 ACR/EULAR criteria). Data analyzed using SPSS (t-tests, chi-square, logistic regression; $p<0.05$). Ethical approval obtained. Primary outcomes: CKD proportion in RA and its associations.
Results: In this study of 50 rheumatoid arthritis (RA) patients, the mean age was 47.4±14.7 years, with a female predominance (60.0%). Chronic kidney disease (CKD) was present in 22.0% of patients. Most CKD cases were in stages 3a (36.4%) and 3b (45.5%). CKD patients had a significantly longer RA duration (5.35±3.24 years vs. 2.60±1.67 years, $p=0.044$) and higher prevalence of hypertension (45.0% vs. 12.8%, $p=0.017$) and anaemia (100% vs. 61.5%, $p=0.014$). The majority (90.9%) of CKD patients used a combination of NSAIDs and DMARDs.
Conclusions: CKD was proportioned in 22% of RA patients, primarily in stages 3A and 3B, with longer RA duration as a key risk factor.

Keywords: Chronic kidney disease, Nephrotoxicity, Rheumatoid arthritis

INTRODUCTION

Rheumatoid arthritis (RA) is a persistent autoimmune disorder that causes inflammation, joint pain, and progressive damage to the synovial joints, often resulting in significant disability and an increased risk of mortality.[1-4] Autoantibodies such as rheumatoid factor (RF) and anti-citrullinated protein antibody (ACPA) may appear long before clinical symptoms emerge, emphasizing the autoimmune nature of the disease. In the past decade, treatment options have improved considerably with the development of disease-modifying antirheumatic drugs (DMARDs), particularly methotrexate (MTX), and the introduction of biologic therapies.[8,9] Nevertheless, RA remains a systemic condition that can lead to complications affecting various organs.

Chronic kidney disease (CKD) is a significant but often overlooked complication in rheumatoid arthritis (RA) patients. Rheumatic diseases and kidney disorders often coexist, with many rheumatologists observing renal dysfunction in a considerable number of their patients. Research indicates that 18% of patients in rheumatology

clinics have a glomerular filtration rate (GFR) below 60 ml/min, in contrast to only 5% of the general population.[10] The onset of CKD in RA patients is influenced by several factors, including persistent systemic inflammation, the toxic effects of medications (such as NSAIDs and DMARDs), and comorbid conditions like hypertension. Early identification and management of kidney involvement in RA patients are critical due to the potential long-term consequences of CKD.

Despite increasing recognition of renal complications in rheumatoid arthritis (RA), there remain significant gaps in understanding the extent and contributing factors of chronic kidney disease (CKD) in this population. While RA-related inflammation, prolonged disease duration, and medication use are suspected to play a role, their precise impact on renal function is not well established. Additionally, the interaction between RA and common comorbidities such as hypertension and anemia in the progression of CKD requires further investigation. The potential nephrotoxic effects of disease-modifying drugs and NSAIDs also warrant closer examination. Given these uncertainties, larger studies with long-term follow-up are needed to clarify the mechanisms underlying CKD in RA patients and to guide preventive and therapeutic strategies. The purpose of the study was to determine the proportion of chronic kidney disease among rheumatoid arthritis patients in a tertiary level hospital. The aim of the study was to determine the proportion of chronic kidney disease among rheumatoid arthritis patients in a tertiary level hospital.

METHODS

This cross-sectional observational study was conducted at the Department of Medicine, Sir Salimullah Medical College and Mitford Hospital, Dhaka, between January 2015 and December 2015. The study included 50 patients with rheumatoid arthritis (RA) who met the 2010 ACR/EULAR classification criteria or were previously diagnosed with RA by a registered physician.

Inclusion criteria

Adult patients of either sex with a confirmed diagnosis of RA. Patients who provided informed consent to participate in the study were included.

Exclusion criteria

Patients with a prior diagnosis of chronic kidney disease (CKD) before being diagnosed with RA were excluded.

Informed consent was obtained from all participants, ensuring confidentiality and voluntary participation. A thorough medical history and clinical examination were conducted, with rheumatoid arthritis (RA) diagnosed using the 2010 ACR/EULAR criteria (score ≥6/10). Chronic kidney disease (CKD) was defined as GFR <60 ml/min/1.73 m² or kidney damage persisting for ≥3 months, categorized into five stages based on GFR and albumin-to-creatinine ratio (ACR). Data were collected using a pre-designed questionnaire, including demographic (age, gender), clinical (RA duration, affected joints, co-morbidities like hypertension and anemia), and laboratory variables (CBC, ESR, CRP, ACPA, RF, urine R/M/E, serum creatinine, and ACR). Estimated glomerular filtration rate (eGFR) was calculated using the MDRD equation. Data were analyzed using SPSS version 19, with continuous variables expressed as mean±SD and categorical variables as frequencies and percentages. Comparisons between CKD and non-CKD groups used t-tests or chi-square tests ($p<0.05$), and logistic regression models assessed associations while adjusting for confounders. The study was approved by the BCPS ethical committee, with participants informed about aims, procedures, and confidentiality. Primary outcomes included CKD proportion in RA patients and its association with demographic, clinical, and laboratory factors.

RESULTS

Table 1 presents the demographic distribution of RA patients. Regarding age, the highest number of patients were in the 50-59 years' age group (15 patients, 30.0%), followed by 11 patients (22.0%) in the 60-69 years' age group, 10 patients (20.0%) in the <30 years age group, 9 patients (18.0%) in the 40-49 years age group, and 5 patients (10.0%) in the 30-39 years age group. The mean (SD) age was 47.4 (14.7) years, with a range from 20.0 to 69.0 years. For gender distribution, females comprised 30 patients (60.0%), while males made up 20 patients (40.0%), resulting in a male-to-female ratio of 0.67:1.

Table 1: Demographic distribution of rheumatoid arthritis patients (n=50).

Variable		Number of patients	Percentage
Age in years	<30	10	20.0
	30-39	5	10.0
	40-49	9	18.0
	50-59	15	30.0
	60-69	11	22.0
	Total	50	100.0
	Mean±SD	47.4±14.7	
Gender	Male	20	40.0
	Female	30	60.0
	Total	50	100

Table 2: Proportion of CKD among RA patients (n=50).

	Frequency (n)	Percentage (%)
CKD	11	22.0
Non-CKD	39	78.0
Total	50	100.0

Table 2 shows the proportion of CKD in patients with RA. The proportion of CKD was 11 (22.0%) among the RA patients.

Table 3: Hematological and biochemical findings in RA patients with CKD (n=11).

Parameters		Mean±SD
eGFR (ml/min/1.73m²)	30-44	39.40±5.45
	45-59	56.50±1.29
	60-89	79.00±14.14
Serum creatinine (mg/dl)	≤1.2	0.98±0.12
	>1.2	1.80±0.10
ACR (µg/mg)	3.5-15	11.08±4.31
	15-50	28.20±7.15

Table 3 presents the hematological and biochemical parameters of RA patients with chronic kidney disease (CKD). The estimated glomerular filtration rate (eGFR) values ranged from 30-44 ml/min/1.73m² (mean±SD: 39.40±5.45), 45-59 ml/min/1.73m² (56.50±1.29), and 60-89 ml/min/1.73m² (79.00±14.14). Serum creatinine levels were predominantly ≤1.2 mg/dl, with a mean±SD of 0.98±0.12, while a smaller proportion had serum creatinine levels >1.2 mg/dl (mean±SD: 1.80±0.10). The albumin-to-creatinine ratio (ACR) was also evaluated, showing a mean±SD of 11.08±4.31 in the 3.5-15 µg/mg range and 28.20±7.15 in the 15-50 µg/mg range.

Table 4: Stages of CKD in RA patients (n=11).

Stages of CKD	Frequency (N)	Percentage (%)
Stage 1	1	9.1
Stage 2	1	9.1
Stage 3a	4	36.4
Stage 3b	5	45.5
Total	11	100

Table 4 shows the stages of CKD among RA patients. The maximum number of patients, 5 (45.5%), had Stage 3B CKD, followed by 4 (36.4%) in Stage 3a, 1 (9.1%) in Stage 2, and 1 (9.1%) in Stage 1.

Table 5: Distribution of patients according to duration of RA in CKD and non-CKD patients (n=50).

Duration of RA (years)	CKD N (%)	Non-CKD N (%)	p value
<1.0	0 (0.0)	18 (46.2)	0.044
1.0-2.0	2 (18.2)	16 (41.0)	
2.1-3.0	3 (27.3)	4 (10.3)	
>3	6 (54.5)	1 (2.6)	
Total	11 (100.0)	39 (100.0)	
Mean±SD	5.35±3.24	2.60±1.67	

Table 5 shows the distribution of patients according to the duration of RA in CKD and Non-CKD patients. A maximum of 6 (54.5%) patients with CKD had a duration of RA >3 years, whereas the majority of 18 (46.2%) patients without CKD had a duration of RA <1.0 year. The mean duration of RA in patients with CKD was 5.35±3.24 years, and without CKD, it was 2.60±1.67 years. There was a statistically significant difference in the duration of RA between patients with CKD and without CKD. The p value of 0.044 indicates statistical significance, suggesting that the difference in the duration of RA between CKD and non-CKD patients is unlikely to be due to chance.

Table 6: Distribution of RA patients according to co-morbidities (n=50).

Co-morbidities	CKD N (%)	Non-CKD N (%)	p value
HTN	5 (45.0)	5 (12.8)	0.017
Anaemia	11 (100.0)	24 (61.5)	0.014
Total	11	39	

Table 6 shows the distribution of patients according to co-morbidities. Hypertension (HTN) was present in 5 (45.0%) patients with CKD and in 5 (12.8%) patients without CKD. All patients with CKD had anaemia, while 24 (61.5%) patients without CKD had anaemia.

Table 7: Distribution of CKD patients according to drug use (n=11).

Drug	CKD patients (n=11)	N (%)
Analgesic (non-NSAIDs)	0	0.0
NSAIDs	1	9.1
Both NSAIDs + DMARDs	10	90.9
Total	11	100.0

Table 7 shows the distribution of drugs used among chronic kidney disease (CKD) patients with rheumatoid arthritis (RA). Among the 11 CKD patients, 9.1% (1 patient) used NSAIDs, while the majority, 90.9% (10 patients), used a combination of NSAIDs and disease-modifying anti-rheumatic drugs (DMARDs). No CKD patients used analgesics (non-NSAIDs).

DISCUSSION

Rheumatoid arthritis (RA) is a global health problem, with a worldwide prevalence estimated at 0.24% (Cross et al, 2014). The World Health Organization (WHO) considers it one of the diseases with the greatest impact on society, and it is the 42nd highest contributor to global disability.[11,12] One of the leading causes of death for rheumatoid arthritis patients is renal dysfunction. This may be due to the disease itself, drugs used in treatment, and other forms of rheumatoid nephropathy.[13] This study was conducted to observe the proportion of chronic kidney disease (CKD) in RA patients, as well as to examine the stages of CKD, the relationship between CKD stages and

the duration of RA, and the relationship between CKD and various drugs used in RA patients.

In this study, 70.0% of patients were older than 40 years, with a mean (SD) age of 47.4 (14.7) years [range: 20.0-69.0]. Our study subjects were much younger than those in the study by Karie et al in France, whose subjects had a mean age of 55.2 years, Hickson et al in the United States, with a mean age of 56 years.[14,15] This variation in age could be due to poor disease control, as most of these patients reside in rural areas with limited access to specialist physicians.

In this study, females (60.0%) were predominant over males (40.0%), with a male-to-female ratio of 0.67:1. Women are affected by RA approximately three times more often than men.[16] A Danish study also found a higher risk of RA among women with a history of preeclampsia, hyperemesis during pregnancy, or gestational hypertension.[17]

The proportion of CKD in RA patients in this study was 22.0% (11 patients). Other studies have reported prevalence rates of 12.75% by Daoussis et al, 15.0% by Karie et al, 18.0% by Hill et al, and 18.34% by Chiu et al.[18,14,10,19]

Among CKD patients, eGFR levels ranged from 30-44 ml/min/1.73m², with a mean±SD of 39.40±5.45, 45-59 ml/min/1.73m² (56.50±1.29), and 60-89 ml/min/1.73m² (79.00±14.14). Serum creatinine levels were predominantly ≤1.2 mg/dl, with a mean±SD of 0.98±0.12, while higher serum creatinine levels (>1.2 mg/dl) had a mean±SD of 1.80±0.10. The albumin-to-creatinine ratio (ACR) ranged between 3.5-15 µg/mg, with a mean±SD of 11.08±4.31, and 15-50 µg/mg (28.20±7.15).

The majority of patients (5, 45.5%) had stage 3B CKD, followed by 4 (36.4%) with stage 3A, 1 (9.1%) with stage 2, and 1 (9.1%) with stage 1 CKD.

Most patients with CKD (6, 54.5%) had a duration of RA >3 years, whereas the majority of patients without CKD (18, 46.2%) had a duration of RA <1 year. The mean duration of RA in patients with CKD was 5.35±3.24 years, while the mean duration in those without CKD was 2.6±1.67 years. There was a statistically significant difference in the duration of RA between patients with and without CKD. This suggests that the majority of our patients had recently been diagnosed with rheumatoid arthritis compared to other studies; Karie et al found a median disease duration of 9.5 years, and Daoussis et al reported a duration greater than 9 years.[14,18]

Hypertension is a major co-morbid condition in CKD. Hypertension was present in 5 (45.0%) patients with CKD and in 5 (12.8%) patients without CKD. All patients with CKD had anemia, while 24 (61.5%) patients without CKD had anemia. Therefore, anemia was found to be more prevalent in RA patients with CKD than in those without CKD.

The majority (90.9%) of CKD patients were taking both NSAIDs and DMARDs. This suggests that most RA patients with CKD were using both NSAIDs and DMARDs for disease control, indicating that disease activity was more likely responsible for the development of CKD than drug toxicity.

This study had some limitations. The study was conducted with a small sample size, which may not be adequate to represent the whole population. The sample was taken purposively, which may introduce bias that can influence the result. This is a single-centered study.

CONCLUSION

In this study, CKD was present in 11 patients (22.0%) with RA. The majority of these patients were in stage 3A or stage 3B of CKD. CKD was more common among patients with a longer duration of RA. No significant association was found between RA drug management and the development of CKD.

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