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# Impact of Rheumatoid Arthritis Medications on the Development of Chronic Kidney Disease

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**Abstract** **Original Research Article**

***Background:*** Rheumatoid arthritis (RA) is a chronic autoimmune disorder associated with systemic complications including chronic kidney disease (CKD). The nephrotoxic effects of RA medications, particularly nonsteroidal anti-inflammatory drugs (NSAIDs) and disease-modifying antirheumatic drugs (DMARDs), are concerning. This study evaluated the impact of RA medication on the development of CKD. ***Methods:*** A cross-sectional study was conducted at Department of Medicine, Sir Salimullah Medical College and Mitford Hospital, Dhaka, from January to December 2015. Fifty RA patients fulfilling the American College of Rheumatology/European League against Rheumatism 2010 criteria were included, excluding those with pre-existing CKD. Demographic data, medication use and renal function data (eGFR, serum creatinine and albumin-to-creatinine ratio) were analyzed using SPSS-19. ***Results:*** The mean age of the participants was 47.4 ± 14.7 years, with a predominance of females (60%). Among the 50 RA patients, 11 (22%) developed CKD. Most patients with CKD (45.5%) had an eGFR of 30–44 ml/min/1.73m². Elevated serum creatinine (>1.2 mg/dl) was observed in 27.3% of the CKD patients. The majority (90.9%) of patients with CKD had used both NSAIDs and DMARDs compared to 51.3% in the non-CKD group. NSAID use alone was more common in patients without CKD (35.9%). ***Conclusion:*** This study suggests that NSAIDs and DMARD combination therapy may contribute to CKD development in patients with RA. Routine renal function monitoring and cautious medication selection are essential to prevent renal complications.

**Keywords:** Rheumatoid arthritis, chronic kidney disease, NSAIDs, DMARDs, Nephrotoxicity.



## INTRODUCTION

The chronic inflammatory condition of Rheumatoid arthritis (RA) establishes itself in synovial joints and produces both joint deterioration and systemic consequences which reduce joint mobility [1, 2]. The multiple comorbidities connected to RA like cardiovascular diseases and infections and renal dysfunction lead to severe impacts on both patient morbidity and mortality [3]. The growing concern for RA patients involves the development of chronic kidney disease because both inflammatory factors linked to RA and medication-based toxicity from long-term treatments contributes to kidney failure [4, 5]. Detecting the link between drug therapy for RA and CKD development remains essential for creating better therapeutic medications that protect kidney health.

The pathophysiology of CKD in RA patients is multifactorial, involving systemic inflammation, endothelial dysfunction, and direct nephrotoxicity from RA treatments [6]. The pain relief medication type NSAIDs commonly used to manage RA leads to renal dysfunction by blocking prostaglandin synthesis to impair renal blood flow and increase risk of CKD [7, 8]. Methotrexate functions as both a disease-modifying antirheumatic drug (DMARD) and a major contributor to nephrotoxic effects and current evidence indicates a direct relationship between the drug dosage and renal dysfunction development [9, 10]. The nephrotic syndrome appears as a renal complication alongside other rheumatoid arthritis medications such as sulfasalazine [11].

Previous investigations examined CKD prevalence in people with RA but researchers presented contradictory evidence regarding what causes renal impairment. Research by Chiu *et al.*, showed RA patients have higher chances of developing CKD since cardiovascular problems dominate over drug-related renal damage [5]. The research of Karie *et al.*, together with Hickson *et al.*, demonstrated that RA-specific factors like chronic inflammation and drug toxicity create the conditions for developing CKD [12, 13]. A deeper research analysis should follow to determine the precise ways in which RA medications influence kidney function.

This study aims to evaluate the association between RA medications and CKD development, assessing the prevalence of renal dysfunction in RA patients based on their pharmacologic exposure. The study evaluates renal function modifications caused by NSAIDs and DMARDs to reveal nephrotoxic effects which guide RA patient treatment strategies. Understanding these associations is critical for developing safer treatment protocols that balance disease control with renal protection.

## OBJECTIVE

The objective of this study was to evaluate the impact of rheumatoid arthritis medications on the development of chronic kidney disease.

## METHODOLOGY & MATERIALS

This cross-sectional observational study was conducted at Department of Medicine, Sir Salimullah Medical College and Mitford Hospital, Dhaka Bangladesh from January 2015 to December 2015. A total number of 50 patients from either sex presented with RA who was clinically and biochemically fulfilling the ACR/EULAR.2010 criteria and previously diagnosed case of RA are selected purposively and included in this study.

## SELECTION CRITERIA

**Inclusion Criteria**

- Adult patients of either sex with RA.
- Who gave consent for inclusion in the study

**Exclusion Criteria**

- Previously diagnosed case of CKD before diagnosis as RA

**Data Collection Technique:**

Data were collected through a pre-structured question form that included demographic details, medication history, and renal function parameters (eGFR, serum creatinine, and albumin-to-creatinine ratio). Blood samples were analyzed at different time points. The principal investigator collected the data. Ethical approval and informed consent were obtained from all participants.

**Ethical Consideration:**

The research protocol was approved by the BCPS ethical committee. The study's aims, objectives, procedure, methods, risks and benefits were explained to respondents in an understandable local language and informed consent was obtained from each patient. Confidentiality of information and records was assured and the procedure was intended to aid physicians and patients in rational case management.

**Statistical Analysis of Data:**

Statistical analysis was performed using Statistical Packages for Social Sciences (SPSS-19). All data were recorded systematically in preformed data collection forms. Quantitative data were expressed as mean and standard deviation, while qualitative data were expressed as frequency distribution and percentage. The summarized data was interpreted and presented in tables.

## RESULTS

**Table 1: Age distribution of RA patients (n=50)**

| Age | Frequency (n) | Percentage (%) |
|---|---|---|
| <30 | 10 | 20.0 |
| 30-39 | 5 | 10.0 |
| 40-49 | 9 | 18.0 |
| 50-59 | 15 | 30.0 |
| 60-69 | 11 | 22.0 |
| Mean±SD | 47.4±14.7 | |

Table 1 shows distribution of RA patients according to age. Maximum 15 (30.0%) patients were in age group 50-59 years followed by 11 (22.0%), 9 (18.0%) and 5 (10.0%) were in 60-69 years, <30 years, 40-49 years and 30-39 years respectively. Mean (SD) age was 47.4 (14.7) years.

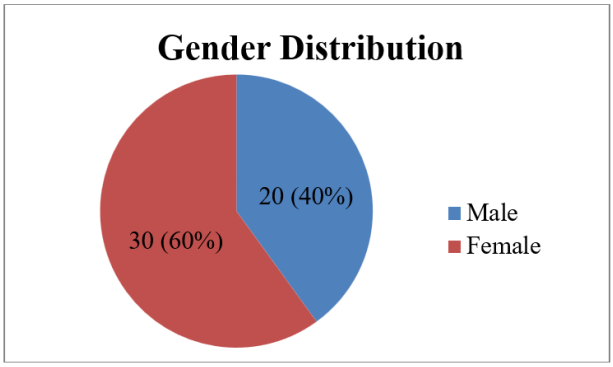


**Figure 1: Gender distribution of RA patients (n=50)**

Figure 1 shows distribution of patients according to gender. Female 30 (60.0%) were predominant than male 20 (40.0%). Male female ratio was 0.67:1.

**Table 2: Hematological and biochemical findings in RA patients with CKD (n=11)**

| Parameter | | Frequency (n) | Percentage (%) |
|---|---|---|---|
| eGFR (ml/minute/1.73 $m^2$) | 30-44 | 5 | 45.5 |
| | 45-59 | 4 | 36.4 |
| | 60-89 | 2 | 18.2 |
| S. Creatinine | ≤1.2 | 8 | 72.7 |
| | >1.2 | 3 | 27.3 |
| ACR (µg/mg) | 3.5-15 | 6 | 54.5 |
| | 15-50 | 5 | 45.5 |

Table 2 shows hematological and biochemical findings of RA patients with CKD. Among CKD patients 5 (45.5%) patients had eGFR 30-44 ml/minute/1.73 $m^2$, 4 (36.4%) patients had eGFR 45-59 ml/minute/1.73 $m^2$ and 2 (18.2%) patients had eGFR 60-89 ml/minute/1.73 $m^2$. 8 (72.7%) patients had S. Creatinine ≤1.2 mg/dl and 3 (27.3%) had S. Creatinine >1.2 mg/dl. 6 (54.5%) patients had ACR 3.5-15 µg/mg and 5 (45.5%) had ACR 15-50 µg/mg.

**Table 3: Distribution of RA patients according to use of drug in CKD and non-CKD patients (n=50)**

| Drug | CKD n (%) | Non-CKD n (%) | P value |
|---|---|---|---|
| Analgesic (non NSAIDs) | 0 (0.0) | 5 (12.8) | <0.001 |
| NSAIDs | 1 (9.1) | 14 (35.9) | |
| Both NSAIDs+DMARDs | 10 (90.9) | 20 (51.3) | |

Table 3 shows distribution of RA patients according to use of drug in CKD and non-CKD patients. Majority 10 (90.9%) of the CKD patients took both NSAIDs and DMARDs where as patients without CKD took both NSAIDs and DMARDs 20 (51.3%).

## DISCUSSION

The research team assessed how medications used to treat rheumatoid arthritis influenced the formation of chronic kidney disease. A higher number of RA patients with CKD exhibited exposure to both NSAIDs and DMARDs (90.9%) than RA patients without CKD (51.3%). NSAID consumption rates remained significantly higher in patients without CKD (35.9%) compared to those who had the disease (9.1%) but non-NSAID analgesics were used exclusively by the non-CKD population. The analysis of blood parameters showed CKD patients scored lower eGFR levels with 45.5% falling in the 30–44 ml/min/1.73m² range and 36.4% in the 45–59 ml/min/1.73m² range. Research data indicates a clear connection exists between the drugs taken by RA patients and the deterioration of their renal function.

The reported prevalence of CKD in RA patients within this study matches previously documented findings which show a higher risk of renal impairment for patients with RA. Chiu *et al.*, established a substantial connection between RA patients and CKD occurrence while emphasizing cardiovascular complications play a substantial role in this relationship [5]. According to Daoussis *et al.*, traditional cardiovascular risk factors play a stronger role than RA disease severity or treatment in developing CKD for patients with rheumatoid arthritis [14]. Our study indicates that medication could play a part in chronic kidney disease development with special emphasis on NSAIDs and DMARDs therapy.

Renal dysfunction occurs when individuals take NSAIDs because these drugs block prostaglandin

synthesis which reduces blood flow to kidneys and results in long-term kidney damage. Our cohort results might indicate that existing renal impairment in patients caused them to stop using NSAIDs. Ejaz *et al.*, conducted a detailed review on NSAID-induced nephrotoxicity which confirms that long-term administration leads to acute kidney damage and subsequent development of CKD [15]. According to Weir renal adverse effects occur with both non-selective NSAIDs and selective COX-2 inhibitors [8]. The high prevalence of combined NSAID and DMARD use in CKD patients underscores the need for careful monitoring and early intervention strategies to prevent further renal compromise.

The primary component DMARD treatment for RA called Methotrexate remains under evaluation because of its potential damage to the kidneys. Erdbrugger and de Groot explained that methotrexate toxicity affects the kidneys yet its degree depends on dose amounts together with patient's additional medical issues and medications [10]. The research of Attar showed that the use of low-dose methotrexate treatment led to unfavorable kidney conditions in patients with rheumatoid arthritis [9]. This study failed to distinguish particular DMARD medications combined with NSAIDs thus creating an exploratory gap for researching the specific drugs that contribute to CKD formation.

The clinical implications of these findings are significant. The prevalence of co-administration between NSAIDs and DMARDs in CKD patients requires RA management guidelines to incorporate routine renal monitoring. According to Karie *et al.*, RA patients who develop kidney disease need to use drug treatment measures carefully to prevent worsening of their renal condition [12]. The burden of CKD in this patient population can be minimized through alternative analgesic prescription and improved DMARD management and protective interventions for the kidneys.

This study demonstrates an association between combining NSAIDs with DMARDs in the treatment of RA and its link to CKD development in patients. This research underscores the importance of continuous medication surveillance because existing studies have focused on cardiovascular disease and amyloidosis as renal deterioration factors. Patients with RA should receive treatment from rheumatologists together with nephrologists because the treatment requires a multidisciplinary approach that achieves better outcomes and reduces renal side effects. Future studies should be undertaken to determine clear cause-effect links between medications and RA patient outcomes so new clinical recommendations can be developed for preventive safety measures.

# CONCLUSION

This study highlights the impact of rheumatoid arthritis medications on chronic kidney disease, with NSAIDs and methotrexate contributing to renal impairment while biologic DMARDs may offer protection. These findings emphasize the need for vigilant renal monitoring in RA patients and balancing disease management with kidney health. Clinically, the study supports a cautious and personalized approach to RA treatment, minimizing nephrotoxic risks.

**Limitations and recommendations**

This was a single center study with small sample size which may limit the generalizability of the findings. The sample was taken purposively, so there may be a chance of bias which can influence the results.

Future research should incorporate larger, multicenter cohorts with prolonged follow-up to more accurately assess long-term renal outcomes. Clinically, routine renal function monitoring and tailored RA management strategies should be emphasized to mitigate nephrotoxic risks and improve patient outcomes.

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**Conflicts of Interest:** There are no conflicts of interest.

**Ethical Approval:** The study was approved by the Institutional Ethics Committee.

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