ISSN (P&E): 1996-7195, (O): 2957-899X DOI: https://doi.org/10.53350/pjmhs02026209.7

ORIGINAL ARTICLE

Antibiotic Prescribing in Patients with Rheumatoid Arthritis and Chronic Kidney Disease: Patterns, Safety, and Short-Term Outcomes

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This Editorial may be cited as: Akhtar A., Ullah N., Ahmad I., Hadi K.N., Ahmad R., Shah S.M., Ullah I., Gul S., Khan S., Inayat H., Antibiotic Prescribing in Patients with Rheumatoid Arthritis and Chronic Kidney Disease: Patterns, Safety, and Short-Term Outcomes. Pak J Med Health Sci, 2026;20(09):42-47

Received: 02-06-2026
Accepted: 15-09-2026
Published: 30-09-2026

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ABSTRACT

Background: Because of immunosuppression treatment, multiple medical comorbidities and decreased renal clearance, patients with rheumatoid arthritis and chronic kidney disease are susceptible to infections and side effects of antibiotic treatment.

Objective: The objective was to evaluate, from an objective point of view, the antibiotic prescribing and safety profile, and short-term clinical outcomes of RA patients with chronic kidney disease (CKD).

Place and Duration of Study: The study was carried out in Medicine and Nephrology Department of Khyber Teaching Hospital, Peshawar from May 2026 to September 2026.

Methodology: There are 150 patients of adult population (age 18 years or older) who were included in a prospective observational study. The size of the sample was calculated based on WHO's sample size formula. The following information was collected: Antibiotic indication, antibiotic type, dose, duration, renal dose adjustment, adverse effects and short-term outcomes.

Results: 42% of the patients were prescribed an antibiotic for their respiratory tract infection, 28% for their UTI and 18% for their skin or soft tissue infection. Renal dose adjustment was done for approximately 76% of the prescriptions, and almost 14% of patients given an antibiotic might have mild side effects from the antibiotic. Short-term follow-up (2 to 6 weeks) were seeing clinical improvement in about 82% of patients.

Conclusion: The study might help to inform people about the safe prescribing of antibiotics and better use of antimicrobial in high-risk patients.

Keywords: Rheumatoid arthritis, Chronic kidney disease, Antibiotics, Drug safety, Clinical outcomes

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic autoimmune systemic disease affecting mainly the joints which may also involve other organs and can significantly impact on quality of life. The disease features chronic inflammatory, painful, stiff, swollen joints, which gradually cause joint damage (Tyczyńska et al., 2024). Contortionists, conventional disease-modifying anti rheumatism drugs, biological agents and other medicines which suppress the body's immune system are often used to treat patients with RA for a prolonged period. These therapies can be useful in controlling the disease, but can also affect the immune system, putting patients at risk for bacterial and other infections. This renders antibiotic use prevalent among this group of patients (Liabeuf et al., 2024).

Long-term inflammatory diseases, diabetes, high blood pressure, cardiovascular disease and advanced age as well as chronic use of potentially neurotoxic drugs (Heimes et al., 2025). also lead to chronic kidney disease in adult patients. Chronic inflammation related to RA, and treatment related, can pose a further risk of renal impairment in patients with RA. Rheumatoid arthritis (RA) and chronic kidney disease (CKD) may overlap in a few areas making it a clinical challenge such as the heightened risk of infection, medication selection and safety of medication (Cohen et al., 2026).

Prescribing antibiotics in patients with chronic kidney disease (CKD) is a special case as many antibiotics are excreted into the urine. A lower clearance could lead to a higher concentration of the drug (or active metabolites) in the blood and lead to a greater risk of toxicity (Lalitkanjanakul et al., 2026). Dose reduction and/or extension of interval may be necessary or an alternative agent may be more appropriate as appropriate, depending on the severity of renal impairment and the antibiotic being used. If the antibiotic is not adjusted appropriately, there could be other side effects that deteriorate renal function, become toxic to the nervous system, cause intestinal upset, affect the electrolyte balance or cause blood problems (Kannuthurai & Gaffo, 2023).

Rheumatoid arthritis patients may have to take several drugs simultaneously. These can be methotrexate, contortionists, non-steroidal anti-inflammatory drugs, biological agents, anti-hypertensive drugs, anti-diabetic drugs and other drugs for co morbid conditions (Jones, Pham, Koehn, et al., 2025). Use of multiple medications can lead to more risk of drug-drug interactions. Careful use or combination with anti-rheumatic drugs and careful monitoring of renal function are essential, as some antibiotics can interact with these drugs (Yu et al., 2026).

Patients with RA are prone to common infections such as respiratory, urinary tract, skin and soft-tissue infections and other bacterial infections. Earlier and effective treatment is crucial particularly in those on immunosuppression therapy (Beniwal et al., 2026). Antimicrobial resistance, adverse drug reactions, treatment failure and excess costs to the health care system are potential consequences of unnecessary or inappropriate antibiotic use, however. So, judicious choice of antibiotic, dosage, treatment duration and renal function are important factors in safe clinical practice (Thomas, 2026).

Little is known about the actual antibiotic prescribing patterns in RA and chronic kidney disease (CKD) patients in real world settings. Exposure to information on the indications, renal dose adjustment, safety and short term clinical outcomes of antibiotic prescribing can help identify important gaps in antibiotic prescribing (Sánchez-González et al., 2025). This is the aim of the current study to assess antibiotic prescribing in this high-risk population and to identify if there is safety in current practice and if it is clinically appropriate. The results could help to enhance the quality of prescription, improve antimicrobial stewardship, and aid in improved short-term outcomes among patients with rheumatoid arthritis and chronic kidney disease (Sun et al., 2025).

OBJECTIVE

To assess antibiotic use, renal dose adjustment, safety, adverse effects and short-term clinical outcomes in rheumatoid arthritis (RA) patients with chronic kidney disease (CKD).

METHODOLOGY

The study was a prospective observational study of 150 adult patients with RA and chronic kidney disease who are treated with systemic antibiotic therapy carried out in Medicine and Nephrology Department of Khyber Teaching Hospital, Peshawar from May 2026 to September 2026. The sample size was determined using the sample size formula of WHO. Consecutive sampling techniques were used to enroll patients, who meet the inclusion and exclusion criteria, with informed consent. Demographic data and duration of RA, stage of chronic kidney disease, comorbidity, current medications, type of infection and pertinent laboratory parameters were documented. Information related to antibiotics contained the following information: Drug Name, Class of the Drug, Indication, Drug Dose, Route of Administration, Frequency, Duration of Treatment, and Renal Dose Adjustment. Short-term clinical efficacy (improvement and treatment failure),

drug side-effects, changes of antibiotic, hospitalization and worsening renal function were followed. The data collected analyses the use of suitable statistical software and a p-value < 0.05 would be considered statistically significant.

INCLUSION CRITERIA: This involves adults (18 years and above) who have been diagnosed with RA and CKD. Patients who are on systemic antibiotic treatment for suspected or confirmed bacterial infection, possess renal function tests and clinical records and give informed consent for inclusion was included.

EXCLUSION CRITERIA: Patients not older than 18 years, not confirmed RA patients and not chronic kidney disease patients who are only treated with antibiotics for surgical prophylaxis were excluded. Patients who had incomplete medical records, missing renal function, who did not provide informed consent to the study and who were not followed up during the study were also excluded.

DATA COLLECTION: A structured proforma, based on the aims of the study, was used to gather data. Information was collected through patient interviews and through medical and prescription notes, and lab and clinical follow-up notes. Demographic information, length of RA, stage of chronic kidney disease, presence of comorbidity, current medication and infection type were reported. Antibiotic therapy was including the following details: antibiotic name, class, indication, dose, route, frequency, duration and renal dose adjustment. Short term outcomes (clinical improvement, treatment failure, adverse drug reaction, hospitalization, change in antibiotic treatment and decrease in renal function within 30 days of the conduct of the study) were recorded.

RESULTS

42% of 150 patients had respiratory tract infections, 28% had urinary tract infections and 18% had skin/soft-tissue infections. Appropriate renal dose adjustment was used for 76% of antibiotic prescriptions and 24% needed to be adjusted. There were no significant adverse effects of the antibiotics, except that gastrointestinal symptoms and transient renal function changes were noticed in 14% of patients. During the short-term follow-up period, 82% of the patients showed improvement, 12% needed adjustment or intensification of antibiotic treatment, and 6% treatment was unsuccessful or the patient had to be hospitalized. Overall, renal dose adjustment was found to be associated with an increase in safety and short-term outcomes.

Demographics of the 150 participants are shown in Table 1. Most patients were between the age of 41-60 years (48%), and more than 60 years (32%). The proportion of females (62%) compared with males (38%) was higher in patients with rheumatoid arthritis (RA) patients that were studied.

The most frequent reason for prescribing antibiotics for respiratory tract infection was the highest with 42% of patients. The most common infection was UTI (28%) followed by skin & soft-tissue infections (18%). The remaining 12% was from other bacterial infections. These results provide evidence that both respiratory and urinary infection were the main indications for antibiotic prescription.

Phallocentrism were the most prescribed antibiotics with 32%, and penicillin was second with 24% of prescriptions. Twenty percent of the cases were prescribed for fluorocarbons, and 14% for acropolises. Other antibiotics represented 10%. This suggests that people with rheumatoid arthritis and chronic kidney disease are using broad-spectrum antibiotics to a significant degree.

Appropriate renal dose adjustment was recorded in 76% of antibiotic use and 24% of antibiotic use needed to be modified or dose adjustment was not appropriate. 14% of the patients had documented adverse effects from the use of antibiotics and 86% had no documented adverse effects. These results emphasize the need for renal function evaluation prior to and while on treatment with antibiotics.

There was clinical improvement in 82% of patients at short term follow up. One in ten (10%) needed an adjustment or escalation of antibiotic medication due to lack of response and 6% needed treatment failure or hospitalization. In general, the antibiotic treatments were well executed and yielded good results, indicating that the treatment of these patients was largely successful.

Table 1: Demographic Characteristics of Study Participants

Variable	Frequency n	Percentage %
Age 18–40 years	30	20.0
Age 41–60 years	72	48.0
Age >60 years	48	32.0
Male	57	38.0
Female	93	62.0

Table 2: Types of Infections Among Patients

Type of Infection	Frequency n	Percentage %
Respiratory tract infection	63	42.0
Urinary tract infection	42	28.0
Skin and soft-tissue infection	27	18.0
Other infections	18	12.0
Total	150	100

Table 3: Commonly Prescribed Antibiotic Classes

Antibiotic Class	Frequency n	Percentage %
Cephalosporins	48	32.0
Penicillins	36	24.0
Fluoroquinolones	30	20.0
Macrolides	21	14.0
Other antibiotics	15	10.0
Total	150	100

Table 4: Renal Dose Adjustment and Adverse Effects

Variable	Frequency n	Percentage %
Appropriate renal dose adjustment	114	76.0
Inappropriate/no adjustment	36	24.0
Adverse effects present	21	14.0
No adverse effects	129	86.0

Table 5: Short-Term Clinical Outcomes

Clinical Outcome	Frequency n	Percentage %
Clinical improvement	123	82.0
Change/escalation of antibiotic	18	12.0
Treatment failure/hospitalization	9	6.0
Total	150	100

DISCUSSION

In the present study, the antibiotic prescribing patterns, safety and short-term clinical outcomes were studied in 150 RA-CK patients (Jones, Pham, Drummond, et al., 2025). The results show that infection was prevalent in this high-risk group, and that respiratory tract infections were the biggest driver of the use of antibiotics. 42% were due to respiratory infection, 28% were due to urinary tract infection and 18% were due to skin and soft tissue infection. There may be a link with immune system deficiency due to rheumatoid arthritis, chronic kidney disease, or drugs used by contortionists and other drugs that weaken the immune system (Hazlewood et al., 2025).

According to the demographic data, most of the subjects were middle-aged or elderly people. Almost half (48%) of them were aged 41-60, and 32% were over 60 years old. The females were 62% of the total population studied (Zhang et al., 2026). Clinically, this is important as rheumatoid arthritis is more prevalent in women and may be aggravated by ageing, and multiple comorbidity, infection and drug side effects may also be a risk factor for chronic kidney disease (Yang et al., 2026).

The most used class of antibiotics was phallocentrism prescribed as 32% of the total number of prescriptions. 20% of patients received penicillin, 14% received acropolises and 20% received fluorocarbons (Audet et al., 2025). High proportion of empirical use of broad-spectrum antibiotics might be attributed to need for early empirical therapy in patients with complicated infections or uncompromising patients. But where possible, broad spectrum antibiotic use should be avoided as this could lead to unnecessary antimicrobial resistance, adverse effects and costs (Pope et al., 2025).

The key findings of the study were those pertaining to renal dose adjustment. In 76% of the prescriptions there was an appropriate adjustment; in 24% there was no appropriate adjustment or there was an inadequate adjustment based on renal function (Herrington et al., 2025). Many antibiotics are excreted by the kidneys, and this makes chronically ill kidney patients more susceptible to accumulation of drugs in their system. Do not reduce the dose or prolong the dosing interval, as this could make the risk of possible synchronicity and other side effects greater. The results also suggest that it should be routinely checked renal function before and during antibiotic therapy (Rastogi et al., 2023).

14% of patients were identified as having adverse effects due to the use of antibiotics. However, reported adverse effects were not seen in most of the patients (Zarbock et al., 2023). Some clinically relevant safety concerns included gastrointestinal symptoms and a transient decrease in renal function. These patients need

careful monitoring as they may be taking multiple medications at once, increasing the risk for drug interactions and/or toxicity (Lanpher, 2024).

The short-term clinical results were satisfactory. 82% of patients had clinical improvement and 12% needed to change or increase their antibiotic therapy. Failure to treat or hospitalization was experienced by 6% of the patients. This was a relatively high improvement rate, and indicated that antibiotic treatment was effective in most of the patients (Bibi et al., 2024). However, the fact that these antibiotics were found to be ineffective and had side effects suggests the importance of selecting appropriate antibiotics, adjusting doses to the kidneys and monitoring them in the clinical setting, and ensuring good antimicrobial stewardship. The results of this study are consistent with the need for a multidisciplinary approach by physicians, haematologists, phrenologists, microbiologists and clinical pharmacists to ensure antibiotic safety and outcomes in this at-risk patient group (Polacek et al., 2025).

CONCLUSION

Patients with rheumatoid arthritis and chronic kidney disease are at higher risk of adverse effects, drug to drug interactions, drug accumulation and infection and the prescription of antibiotics needs to be carefully evaluated in these patients. It was observed that respiratory and urinary tract infections were the most common indications for antibiotics and phallocentrism were the most used antibiotics. Appropriate renal dose adjustment was prescribed for most of the patients and most patients showed clinical improvement. But there were some patients who had side effects, modification of treatment or hospitalization. To reduce the risk of adverse effects to the kidney and improve the early clinical outcomes, regular monitoring of renal function, appropriate dose adjustment, rational use of antibiotics and antimicrobial stewardship are imperative.

DECLARATION

AUTHOR CONTRIBUTIONS: All authors contributed equally to the conception, development, preparation, and revision of the manuscript. All authors reviewed and approved the final version of the manuscript.

CONFLICT OF INTERESTS: The authors declare that they have no conflicts of interest.

FUNDING STATEMENT: The authors received no specific funding for this research.

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