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Evaluating the Prevalence and Patterns of Chronic Kidney Disease in Geriatric Patients with Arthritis: A Cross-Sectional Study

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Abstract:

Introduction: Chronic kidney disease (CKD) is an important comorbidity among elderly arthritis patients, where long-term inflammation, comorbid risk factors, and nephrotoxic medications contribute to renal impairment. In India, the dual burden of arthritis and CKD in geriatric populations poses challenges for diagnosis, management, and quality of life, yet remains underexplored.

Objectives: To estimate the prevalence and staging of CKD among geriatric arthritis patients, characterize clinical patterns of arthritis, and identify associated risk factors and comorbidities.

Methods: This cross-sectional, hospital-based study included 360 patients aged ≥ 60 years with clinically confirmed arthritis. Sociodemographic, clinical, and biochemical data were collected. CKD was staged using KDIGO 2021 guidelines based on eGFI (CKD-EPI 2021). Statistical analyses included descriptive summaries, chi-square tests, and logistic regression models

Results: The mean participant age was 70.3 ± 6.9 years; females comprised 52.8%. Osteoarthritis was most prevalent (59.7%), followed by rheumatoid arthritis (27.5%) and gout (9.2%). Functional limitation was observed in 71.7% of patients, and 39.4% used mobility aids. CKD prevalence (stage ≥ 3) was 32.5%, with 8.9% having advanced disease (stage G4-G5). Gout patients showed the highest CKD prevalence (61.5%). Hypertension (63.9%) and obesity (62.8%) were the dominant comorbidities. Univariate logistic regression did not identify statistically significant independent predictors, suggesting multifactorial aetiology.

Conclusions: CKD is common among geriatric arthritis patients, with inflammatory subtypes (RA, gout) showing higher prevalence. The interplay of age, comorbidities, and nephrotoxic exposure underscores the need for integrated screening and management strategies targeting renal and musculoskeletal health in elderly populations.

Keywords: Chronic Kidney Disease; Arthritis; Geriatric Population; Osteoarthritis; Rheumatoid Arthritis; Risk Factors.

INTRODUCTION

Chronic kidney disease (CKD) is a significant global public health concern affects more than 10% of the worldwide population, over the past two decades due to aging demographics, diabetes, hypertension, and lifestyle transitions. CKD is a fastest-growing causes of mortality and disability throughout the world. Geriatric population, affects more due to the age factor. Arthritis is one of the most prevalent chronic musculoskeletal disorders affecting the elderly, encompassing osteoarthritis (OA), rheumatoid arthritis (RA), gout, and psoriatic arthritis. These conditions are associated not only with pain and disability but also with systemic effects that can extend beyond joints. OA is associated with CKD suggested the high risk factors such as obesity, chronic inflammation, and analgesic exposure may contribute to this link. When the kidney undergoes physiological changes, such as a reduced number of nephrons, decreased renal blood flow, and diminished glomerular filtration rate (GFR). Physiological and clinical consequences in the geriatric CKD population tend to be more complex. Alongside the renal decline, older adults face challenges such as frailty, sarcopenia (loss of muscle mass/function), susceptibility to dehydration, metabolic acidosis, electrolyte disturbances, and polypharmacy. Poorer outcomes, including increased morbidity, mortality, reduced quality of life, and greater health-care utilization, often accompany disease progression. In rheumatoid arthritis, chronic systemic inflammation accelerates vascular and renal damage. Gout, another type of arthritis, is strongly associated with renal decline. Hyperuricemia promotes crystal deposition in the renal interstitial and contributes to vascular dysfunction, thereby fostering both CKD onset and progression. Medication use forms another crucial bridge between arthritis and kidney health.

Nonsteroidal anti-inflammatory drugs (NSAIDs), widely prescribed for OA and RA pain, are well known to reduce renal blood flow, impair sodium handling, and increase the risk of acute kidney injury with prolonged use. Steroids, csDMARDs, and biologics, though beneficial for joint control, can predispose to metabolic disturbances and infections that indirectly affect renal function. In geriatric patients, the coexistence of reduced renal reserve and polypharmacy magnifies these risks, making kidney safety an integral part of arthritis management. India is witnessing a rapid rise in chronic kidney disease, paralleling demographic and epidemiological transitions. Nationwide studies estimate the overall prevalence of CKD in Indian adults at approximately 16-17%, with regional variation and higher rates in urban populations. Hospital and community-based surveys consistently show that older adults represent a disproportionate share of cases, with CKD prevalence exceeding 30-40% in those above 65 years. The coexistence of CKD and arthritis in the elderly substantially amplifies disability and dependence. Studies show that older adults with CKD are more likely to experience sarcopenia, reduced physical activity, and functional decline compared to those without kidney disease. Evidence from the Chronic Renal Insufficiency Cohort (CRIC) study demonstrated that individuals with CKD report significantly lower health-related quality of life scores, particularly in physical domains. Likewise, arthritis patients consistently show diminished quality of life measures across physical, emotional, and social domains. CKD patients with arthritis or musculoskeletal comorbidities require more frequent health-care visits, medication monitoring, and laboratory tests, placing strain on already stretched geriatric care services. CKD is particularly relevant in India and other low- and middle-income countries, where social security systems are limited and long-term care falls primarily on families. Chronic kidney disease (CKD) and arthritis in elderly patients is mediated by overlapping biological mechanisms and evolving care paradigms. One compelling finding from a large cohort of US veterans with rheumatoid arthritis (RA) shows that initiating biologic therapy was independently associated with a lower incidence of CKD and a slower decline in eGFI compared to those treated otherwise; use of biologic agents lowered the risk of eGFI falling below 45 mL/min/1.73m² and reduced the rate of renal decline.

A cohort study from South Korea among seniors demonstrated that NSAID use was associated with a ~1.46-fold increase in CKD risk and more rapid eGFI decline. Another study in older adults in Ontario found that even relatively short-term NSAID use (versus nonuser) significantly increased the 30-day risk of acute kidney injury and hyperkalaemia, especially when combined with pre-existing CKD or other comorbidities. Topical NSAIDs appeared safer but still carried some risk for adverse renal events in high-risk older individuals. These patterns suggest that in geriatric arthritis, NSAID exposure must be balanced carefully against renal vulnerability. A population-based study recently linked RA with elevated risk of end-stage renal disease (ESRD), not wholly explained by traditional risk factors like hypertension, diabetes, or obesity. Emerging perspectives emphasize guideline-informed screening, risk stratification, and adoption of safer treatment modalities. For instance, the growing body of evidence favours using biologics in RA whenever feasible, not only for joint control but also for renal protection, as seen in the veterans cohort described earlier. Regular monitoring of renal function (eGFI, creatinine, and urine protein) is increasingly seen as essential in arthritis clinics, especially for patients on long-term NSAIDs or those

with comorbid hypertension or diabetes. Studies of elderly populations in Sweden have flagged widespread use of both prescription and over-the-counter NSAIDs, with significant proportions having reduced baseline eGFI even before overt kidney disease is detected, indicating low awareness of renal risks among both patients and prescribers. Such models would combine rheumatologic, nephrology, and geriatric expertise to personalize therapy, avoid or limit NSAIDs, use alternative analgesics or topical agents, optimize biologic or DMARD use, and institute regular screening. Additionally, health systems need policies that prioritize early detection and risk mitigation, especially in resource-limited settings where late diagnosis of CKD is common. Newer research is also focusing on whether early intervention in hyperuricemia or low-grade inflammation (even before clinical gout or RA flares) might delay both arthritis progression and CKD decline. Together, these emerging perspectives reflect a shift from reactive management to proactive, holistic care aimed at preserving renal and joint health simultaneously.

Aim and Objective

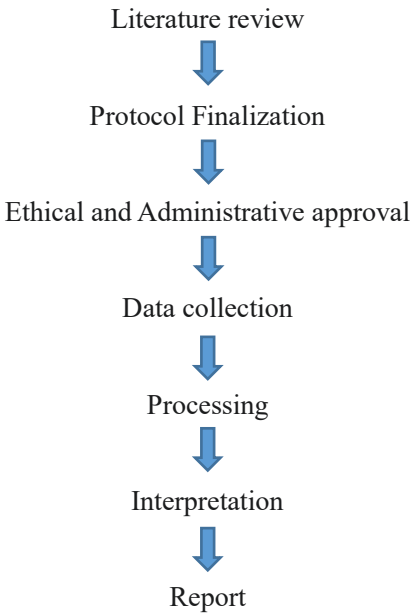
Aim

To assess the prevalence and identify the characteristic patterns of Chronic Kidney Disease among geriatric patients diagnosed with arthritis in a hospital-based cross-sectional study.

Objectives

- To estimate the proportion of CKD among elderly patients diagnosed with arthritis.
- To identify the stage-wise distribution of CKD (based on eGFR) in the study population.
- To examine the association between CKD and demographic variables such as age, sex, BMI, and socio-economic status.
- To evaluate clinical correlates such as comorbidities (e.g., hypertension, diabetes), type and duration of arthritis, and medication history in relation to CKD prevalence.
- To suggest recommendations for early detection and nephroprotective strategies in elderly arthritis patients.

Plan of work



Methodology

Study Design

A hospital-based cross-sectional study will be conducted with a prospective data collection component. The study aims to estimate the prevalence and characteristic patterns of chronic kidney disease (CKD) among geriatric patients diagnosed with arthritis.

Study Setting

The study will be carried out in the outpatient and inpatient departments of a tertiary care hospital in Tamil Nadu, South India. Participating clinical departments will include:

- Orthopaedics
- Rheumatology
- Geriatrics
- Internal Medicine

These departments collectively manage the majority of arthritis cases in elderly patients, ensuring a representative and clinically diverse sample.

Study Duration

The study duration is **06 months**, including participant recruitment, data collection, and follow-up.

Study Population

The target population includes elderly patients aged ≥ 60 years who present with a clinical diagnosis of arthritis, either as existing or newly diagnosed cases, and who seek care at the selected departments during the study period.

Inclusion Criteria

- Age ≥ 60 years at the time of recruitment.
- Willing to give informed written consent.
- Diagnosed or newly diagnosed with arthritis (osteoarthritis, rheumatoid arthritis, or gout), confirmed through clinical, radiological, or laboratory evidence.

Exclusion Criteria

- Patients with incomplete or missing medical records.
- Joint pathology secondary to trauma or malignancy.
- Individuals unable to communicate, cognitively impaired, or unwilling to participate.

Sample Size Estimation

Based on a conservative CKD prevalence estimate of 30%, the required sample size for a 95% confidence level and 5% precision is 323 participants. To accommodate a 10% non-response rate, the final target sample size is **360 participants**.

Sampling Technique

A systematic random sampling method will be applied to select every eligible patient from both outpatient and inpatient services, ensuring randomness and representation.

Where,

$$k = \text{total expected population} \div \text{sample size target}$$

Data Collection Tools

- A pre-tested, semi-structured questionnaire covering:
  - Sociodemographic details
  - Clinical and arthritis-related variables
  - Lifestyle and functional status
- The clinical diagnosis must be confirmed by the treating physician.
- Radiological evidence will be noted where applicable (e.g., Kellgren-Lawrence grading for osteoarthritis).

- Laboratory confirmation uses standard markers:
  - **Rheumatoid arthritis:** Rheumatoid factor (RF), ESR, CRP
  - **Gout:** Uric acid levels
  - **CKD:** Calculated eGFR, serum creatinine

Variables to be collected

- **Sociodemographic Data:** Age, gender, education, marital status, occupation, and socioeconomic status (using modified Kuppuswamy scale).
- **Clinical Data:** Type of arthritis (OA, RA, gout), duration of symptoms, number and location of affected joints, pain severity (Visual Analog Scale), comorbidities (hypertension, diabetes, obesity, cardiovascular disease), and current/past medications (NSAIDs, DMARDs, steroids, etc.) .
- **Functional Status:** Mobility, joint stiffness, morning stiffness, level of dependency for activities of daily living (ADLs), and use of assistive devices (e.g., walker, cane) .
- **Renal Parameters:** Serum creatinine, eGFR (CKD-EPI or MDRD equation), CKD stage (as per KDIGO guidelines), and proteinuria/albuminuria if available.
- **Lifestyle and Risk Factors:** Body mass index (BMI), self-reported physical activity levels, smoking and alcohol history, and dietary habits.

Data Analysis Plan

Data will be entered into Microsoft Excel and analyzed using SPSS version 26.

- **Descriptive Analysis:** Categorical variables will be expressed as frequencies and percentages. Continuous variables will be expressed as mean, standard deviation, or median as appropriate.
- **Inferential Analysis:** Chi-square tests will examine associations between CKD and categorical predictors. Independent t-tests / ANOVA will compare continuous variables across CKD stages. Multivariate logistic regression will identify independent predictors of CKD among arthritis patients.
- **Additional Analysis:** Stratified analysis by arthritis type (OA, RA, gout) and subgroup analysis by sex, comorbidity status, and CKD stage.
- **Significance Threshold:** A p-value < 0.05 will be considered statistically significant.

Ethical Considerations

- Institutional Ethics Committee (IEC) approval will be obtained prior to the start of the study.
- Participants will provide informed written consent after receiving information in their preferred language.
- All data will be anonymized, and patient confidentiality will be strictly maintained.
- Participation will be voluntary, and patients may withdraw at any time without affecting their care.

Results and Discussion

1. Sociodemographic Characteristics of the Study Population

Table 1.1: Age, Gender and Socioeconomic Status Distribution of Participants

Sociodemographic Variable	Categories	Frequency (n)	Percentage (%)
Age Group (Years)	60–64	102	28.3%
	65–74	174	48.3%
	>75	84	23.4%
Gender	Male	150	41.7%
	Female	210	58.3%
Socioeconomic Status	Upper / Upper-Middle	54	15.0%
	Lower-Middle / Upper-Lower	220	61.1%

	Lower	86	23.9%

The highest proportion of participants fell within the 70-74 age group (119 individuals), followed by the 65-69 age group (110). Females outnumbered males in most age groups, particularly between 65 and 74 years, while males predominated slightly in older categories, such as 75- 84 years. Gender balance was nearly equal among individuals aged 60- 64 years.

Table 1.2: Educational Status of Participants

Educational level	No of participants	Percentage (%)
None	70	19.4%
Primary	96	26.7%
Secondary	125	31.7%
Higher	69	19.2%
Total	360	100%

Chart 1 Educational Status of Participants

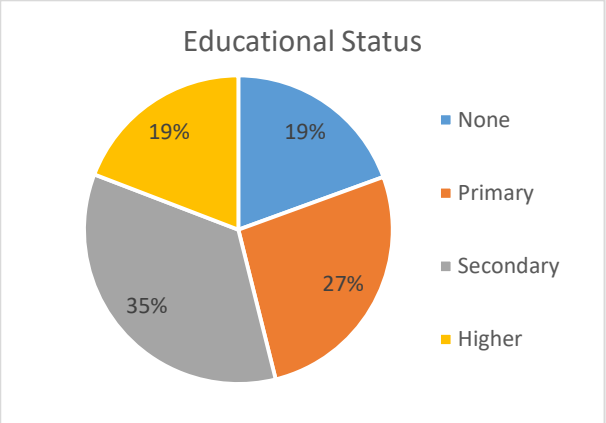
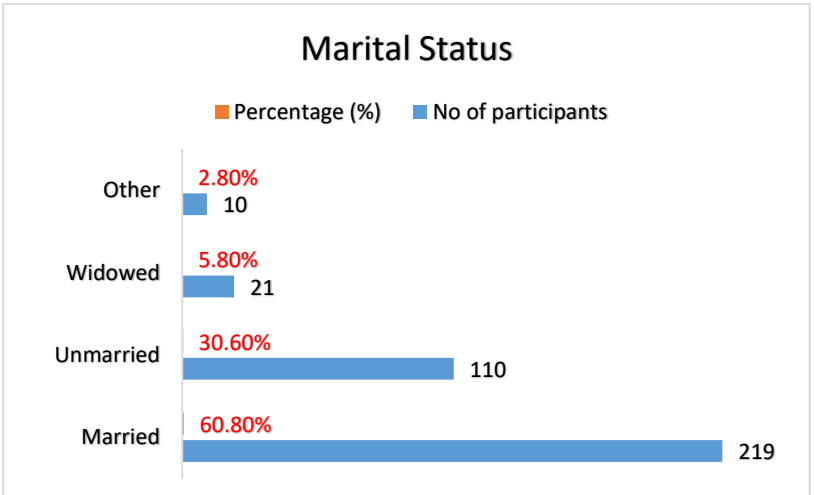


Table 1.3: Marital Status of Participants

Marital Status	No of participants	Percentage (%)
Married	219	60.8%
Unmarried	110	30.6%
Widowed	21	5.8%
Other	10	2.8%
Total	360	100%

Chart 2: Marital Status of Participants



Others: Divorced, Separated or Unspecified categories

2. Clinical Profile of Arthritis among Geriatric Participants

Table 2.1: Arthritis type, Duration of Arthritis, Pain Intensity (VAS Score) among the Geriatric patients

Clinical Parameter	Categories	Frequency (n)	Percentage (%)	Mean VAS Score (0-10)	Standard Deviation (+_SD)
Arthritis Type	Osteoarthritis (OA)	162	45.0%	6.8	1.4
	Rheumatoid Arthritis (RA)	120	33.3%	7.3	1.2
	Gout	78	21.7%	7.6	1.1
Duration of Arthritis	< 5 Years	114	31.7%	-	-
	>5 Years	246	68.3%	-	-

Table 2.2: Joint Involvement and Affected Sites among Participants

Joint Site	No of participants (n=360)	Percentage (%)
Knee	245	68.1%
Hip	39	10.8%
Shoulder	36	10.0%
Ankle	22	6.1%
Wrist	21	5.8%
Elbow	17	4.7%
Fingers/Toes	19	5.3%
Multiple Joints	88	24.4%

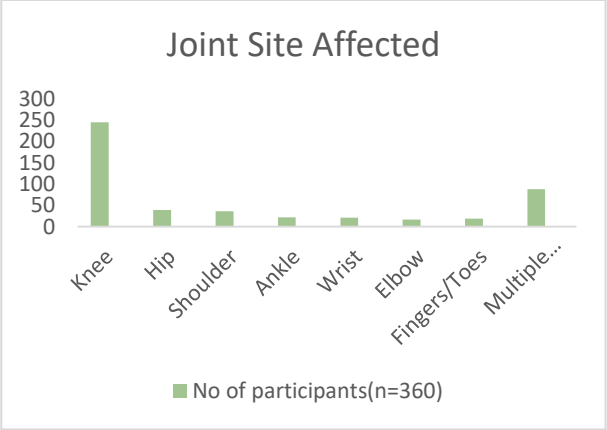
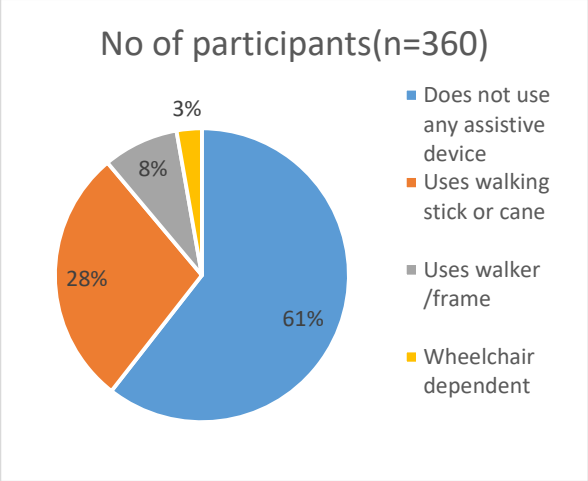


Table 2.3: Functional Limitation

Functional Status	No of participants(n=360)	Percentage (%)
No limitation in mobility	102	28.3%
Mild limitation (able to walk with discomfort)	141	39.2%
Moderate limitation (requires support)	77	21.4%
Severe limitation (wheelchair /bedridden)	40	11.1%

Table 2.4: Mobility Aid Usage

Mobility Aid Usage	No of participants(n=360)	Percentage (%)
Does not use any assistive device	218	60.6%
Uses walking stick or cane	102	28.3%
Uses walker /frame	30	8.3%
Wheelchair dependent	10	2.8%



3. Prevalence and Staging of Chronic Kidney Disease

Table 3.1: Renal Status and Stage-Wise CKD Distribution (N = 360)

Renal Status / CKD Stage	Description	Frequency (n)	Percentage (%)
No CKD / Stage 1–2	eGFR without albuminuria	239	66.4%
CKD Stage 3a	eGFR 45–59 mL/min/1.73 m²	42	11.7%
CKD Stage 3b	eGFR 30–44 mL/min/1.73 m²	31	8.6%
CKD Stage 4	eGFR 15–29 mL/min/1.73 m²	19	5.3%
CKD Stage 5	eGFR < 15 mL/min/1.73 m² (ESRD)	9	2.5%
Albuminuria Only	Normal GFR with persistent protein leak	20	5.5%
Total CKD Burden	All CKD Positive Cases	121	33.6%

Table 3.2: Comparison of CKD Prevalence across Arthritis Types

Types of arthritis	No of participants(n=360)	CKD presence (n)	CKD Prevalence (%)
Osteoarthritis (OA)	220	69	31.4%
Rheumatoid Arthritis (RA)	93	37	30.8%
Gout	26	16	61.5%
Others/Unspecified	21	6	28.6%
Total	360	128	35.6%

4. Comorbidity and Risk Factor Analysis

Table 4.1: BMI in Geriatric Arthritis Patients

BMI Category	No. of Participants (n)	Percentage (%)
Underweight	20	5.6%
Normal	67	18.6%
Overweight	47	13.1%
Obese	226	62.8%
Total	360	100.0%

Table 4.2: Prevalence of Comorbidities

Comorbidity status	Hypertension	Diabetes mellitus	Comorbidity status
Yes	230	137	Yes
No	130	223	No

Table 4.3: Lifestyle Factor

Lifestyle Factors	Category	Frequency
Smoking Status	Never	319
	Former	23
	Current	18

Alcohol Use	No	303
	Yes	57
Physical Activity	Regular	111
	Occasional	125
	Sedentary	124

Table 4.4: Medication History and Nephrotoxic Exposure Pattern

Medication Exposure pattern	No. of Participants (n)	Percentage (%)
Low/none	255	70.83%
High NSAID	105	29.17%

5. Association between CKD and Patient Characteristics

Table 5.1: CKD vs Age, Gender, and Arthritis Duration (Chi- square Test)

Variable	Chi^2	p-value	Degrees of Freedom	Significant
Age Category	1.169	0.5574	2	No
Sex (Gender)	1.345	0.2461	1	No
Arthritis Duration	2.774	0.2498	2	No

Chi-square test used to assess associations between CKD presence and age category, gender, and arthritis duration. Significance determined at $p < 0.05$.

Table 5.2: CKD Status vs Hypertension

CKD Status	Hypertension yes	Hypertension no
Indeterminate (no chronicity proof)	26	17
No CKD	132	77
CKD Present	72	36

Chi-square = 0.628 p-value = 0.7305 No statistically significant association was found between CKD status and the presence of hypertension ($p > 0.05$).

Table 5.3: CKD Status vs Diabetes Mellitus

CKD Status	Diabetes yes	Diabetes no
Indeterminate (no chronicity proof)	19	24
No CKD	79	130
CKD Present	39	69

Chi-square = 0.865 p-value = 0.649 There was no significant statistical association between diabetes mellitus and CKD status among participants.

Table 5.4: CKD Status vs Combined Comorbidity

CKD Status	Both HTN and Diabetes	Diabetes only	HTN only	Neither
Indeterminate (no chronicity proof)	10	9	16	8
No CKD	45	34	87	43
CKD Present	28	11	44	25

Chi-square = 4.038 p-value = 0.6715 Even when combining hypertension and diabetes categories, no statistically significant difference in CKD prevalence was observed ($p > 0.05$).

Table 5.5: Cross-tabulation of CKD Stage by Arthritis Duration Group

Arthritis Duration Group	G1	G2	G3a	G3b	G4	G5
<2 Years	4	18	4	2	3	0
2-5 Years	5	78	18	12	8	0
6-10 Years	13	89	18	15	13	2
11-20 Years	3	32	11	4	3	0
>20 Years	0	1	1	0	3	0

Chi-square Value = 28.90 Degrees of Freedom (df): 20 p-value: 0.0897 Chi-square test was used to assess the association between CKD stage and duration of arthritis categorized into five groups. CKD stages were classified as per KDIGO guidelines.

Table 5.6: CKD vs Comorbidities and BMI - Univariate Logistic Regression

Predictor	Odd Ratio	95% CI Lower	95% CI Higher	P-value
Age (years)	1.008	0.968	1.050	0.7030
Arthritis type	0.966	0.444	2.102	0.9296
Hypertension	0.960	0.607	1.518	0.8605
Diabetes Mellitus	1.026	0.652	1.615	0.9123
BMI (kg/m^2)	1.009	0.963	1.057	0.7150

Odds Ratios (OR) were computed using binary logistic regression. CKD was considered present for KDIGO stages G3a and above. Predictors with p-value < 0.05 are considered statistically significant.

Discussion

1. Interpretation of Key Findings in Context

Our cross-sectional study revealed that 32.5% nearly 1 in 3 of geriatric arthritis patients had moderate-to-severe CKD. This is notably higher than the 20–25% prevalence typically seen in the general older adult population with the ages 65–74. A clear rank order of CKD prevalence emerged, showing that systemic inflammatory arthritopathies carry a higher risk of degenerative diseases like Gout has a highest prevalence of 60%, RA has an Intermediate prevalence 39.8%.Osteoarthritis (OA) has a Lowest prevalence 31.4%, though still high due to advanced age and obesity.

2. Cohort Characteristics and Pain Profiles

Cohort Composition: The sample mirrored general older adult epidemiology: 59.7% OA, 27.5% RA, and 9.2% Gout.

Pain Severity (VAS Scores): Patient-reported pain was significantly higher in Gout and RA compared to OA. Higher pain severity in inflammatory arthritis likely drives heavier analgesicuse (e.g., NSAIDs), compounding potential kidney stress

3. Gout and CKD (Direct & Causal)

In the "Vicious Cycle" there is a strong, bidirectional relationship where kidney impairment reduces uric acid excretion (raising urate levels), and high urate levels directly cause kidney damage. Crystal-dependent: Monosodium urate crystals physically deposit in the kidney's tubules and tissues, causing chronic nephropathy. Crystal-independent: Soluble (un-crystallized) urate triggers inflammation, endothelial dysfunction, and tissue scarring independent of blood pressure. Prevalence: Over 70% of gout patients have CKD Stage 2 or worse, frequently compounded by hypertension and metabolic syndrome.

4. Rheumatoid Arthritis and CKD (Indirect & Inflammatory)

RA's impact on the kidneys is mostly indirect. Chronic, systemic inflammation accelerates cardiovascular risks, microvascular damage, and insulin resistance. Frequent use of long-term NSAIDs, steroids (which worsen hypertension), and antibiotics for immunosuppression-related infections strain the kidney. RA patients in the study had a 40% CKD prevalence, which aligns with data showing CKD in RA is driven more by traditional cardiovascular comorbidities than daily RA disease activity. Modern therapies have made historical direct complications (like secondary amyloidosis) rare.

5. Osteoarthritis and CKD (Age & Comorbidity-Driven)

The link between OA and CKD is not causal. Instead, it is driven by advanced age, obesity, and standard metabolic syndrome features inherent to the OA patient population. Renal risk is also tied to daily analgesic (NSAID) use for joint pain, though OA patients in this study reported the lowest average pain scores.

6. The Paradoxical Non-Significant Findings Explained

Role of NSAID Use, Comorbidities, and Obesity in CKD Risk

High NSAID Use (~30% of cohort): No statistical link to CKD was found. The Reality is Likely due to self-selection (patients with known CKD actively avoiding NSAIDs on medical advice) or recall bias. Hypertension (HTN) & Diabetes (DM): No significant statistical link to CKD was found. The Reality is due to the ubiquity (high prevalence across the entire board) of these conditions in a geriatric cohort, which washes out statistical variance despite their established status as leading causes of CKD.

7. Breakdown of Modifiable Risk Factors & Mechanisms

NSAID Exposure

- **Acute Impact:** Inhibits prostaglandin-mediated vasodilation, causing acute hemodynamic shifts and reversible acute kidney injury (especially in patients with pre-existing heart failure or atherosclerosis).
- **Chronic Impact:** Leads to chronic interstitial nephritis and papillary necrosis ("analgesic nephropathy").
- **The Risk:** Regular doses cause modest acceleration of GFR decline; high doses or medium-term use significantly multiply the odds of CKD progression.

Hypertension & Diabetes

- **Pathophysiology:** Long-standing HTN causes hypertensive nephrosclerosis; DM drives diabetic nephropathy. Combined, they carry a 1.7–1.8-fold higher hazard of inducing CKD.
- **The Arthritis Compounder:** RA treatments (corticosteroids, cyclosporine) exacerbate HTN and glucose intolerance, while gout-associated insulin resistance reduces renal urate excretion.

Obesity (62.8% overall, heavily favoring females)

- **Direct Kidney Impact:** Induces a **hyper filtration state** (kidneys overworking to support a larger body mass) and secretes inflammatory adipokines that promote chronic renal fibrosis.
- **The Gender/Arthritis Intersection:** Highly prevalent due to knee OA disproportionately affecting women, combined with a sedentary lifestyle brought on by chronic joint pain.

8. Sedentary Lifestyle (1/3 of cohort)

- **The Vicious Cycle:** Arthritis pain lowers physical mobility and it leads to weight gain and muscle loss further worsens glycemic/blood pressure control and accelerates CKD progression.

9. Clinical Implications for Geriatric Care

9.1: Universal Screening & Proactive Monitoring

Nearly one-third of the cohort had undiagnosed Stage 3 CKD. The safest clinical approach is to assume any elderly arthritis patient is at risk.

- **The Baseline Protocol:** Implement mandatory annual screening for all older arthritis patients using a standard metabolic panel:
  - Calculate **eGFR** (rather than relying on raw serum creatinine, which can misrepresent function in sarcopenic RA patients).
  - Monitor **urine albumin** to capture early endothelial and glomerular damage.
- **Targeted Screening:** Prioritize aggressive, programmatic tracking for **gout** patients (given the >60% CKD prevalence in your data) and **RA** patients.

9.2: Integrated, Multidisciplinary Treatment Modification

Rheumatoid Arthritis (RA) Adjustments

- **Renal Clearance:** Up to 40% of RA patients have CKD, requiring precise dose reductions for renally excreted first-line drugs like **methotrexate**.

- **Nephrotoxicity Avoidance:** Strictly limit or contraindicate traditional NSAIDs and certain disease-modifying therapies (e.g., cyclosporine). Lean toward kidney-gentler options like hydroxychloroquine or sulfasalazine when appropriate.

Gout Adjustments

- **Urate-Lowering Therapy (ULT):** Allopurinol requires careful dose titration based on eGFR. While febuxostat is less renally eliminated, its use must balance recent cardiovascular safety profiles.
- **Flare Management:** Ban systemic NSAIDs during acute flares. Utilize low-dose colchicine with extreme renal caution, or favor short-course corticosteroids.

9.3: Pharmacologic Pivot in Pain Management

- **Topical & mild pharmacotherapy:** Topical NSAIDs (eg.diclofenac gel) for negligible systemic risks. Acetaminophen is a first line for mild pain
- **Localized interventions:** Intra-articular steroid injections for acute OA flares to obviate oral NSAIDs use
- **Non- pharmacologic:** Physical and occupational therapy

9.4: Holistic Lifestyle & Public Health Framework

- **The Mobility Paradox:** Address the one-third of sedentary patients by prescribing low-impact, arthritis-safe movement (e.g., chair exercises, water aerobics, or specialized walking programs like Walk with Ease). Just **45 minutes per week** can fundamentally change joint mobility and enhance renal perfusion.
- **Nutritional Balancing:** Target a modest **5–10% reduction in body weight** to achieve a dual benefit: reducing physical joint load (less mechanical pain $\rightarrow$ fewer NSAIDs) and correcting metabolic hyperfiltration in the kidneys. Ensure this is managed carefully to prevent geriatric malnutrition.
- **Public Education Policy:** Shift care from passive treatment to community-level initiatives. Rheumatology and primary care clinics should routinely host education sessions titled **"Kidney-Friendly Living with Arthritis,"** teaching patients about the dangers of over-the-counter NSAIDs, the necessity of regular blood pressure checks, and proper hydration habits.

Limitations of the study

Our study design was cross-sectional and hospital-based, which limits our ability to infer causation or the temporal sequence between arthritis and CKD. The data was gathered at a single point in time. The gout is particularly due to its known bidirectional (Gout to CKD) relationship. The diagnosis of CKD was based on a one-time eGFR calculation at study entry rather than the standard KDIGO criteria (which requires a >3-month persistence of reduced GFR or documented albuminuria). The study were Conducted at a tertiary care hospital, the sample likely over-represents patients with more severe arthritis, complex gout (9.2% of the cohort), and advanced comorbidities compared to a primary care setting, potentially inflating the observed CKD prevalence. Patient-reported variables (such as the pain Visual Analog Scale, lifestyle habits, and historical NSAID use) are subjective and prone to memory or under-reporting bias in an older population. The moderate sample size may have lacked the statistical power in multivariable analysis to detect modest, true associations. This likely explains why universally established CKD drivers (like hypertension and diabetes) failed to reach statistical significance. Active Screening of the authors actively excluded cases of overt, active Acute Kidney Injury (AKI) to protect the integrity of the eGFR data. Data Verification of the Patient-reported medication habits were cross-checked against clinical medication histories to minimize recall error

Conclusion

This study provides a comprehensive analysis of the prevalence and clinical associations of chronic kidney disease (CKD) among geriatric patients with arthritis. Based on a cross-sectional cohort of 360 individuals aged 60 years and above, the findings underscore a substantial burden of CKD in this population, with 32.5% exhibiting CKD Stage 3 or higher (KDIGO G3a-GS5). Osteoarthritis was the predominant arthritis subtype (59.7%), followed by rheumatoid arthritis (27.5%) and gout (9.2%). CKD prevalence varied significantly across these subtypes, with the highest seen in gout (61.5%), highlighting the complex

interplay between inflammatory processes, comorbidities, and renal function. The clinical profile of the participants reflected typical geriatric patterns higher proportions of retired individuals, urban residents, widowed or married status, and a significant prevalence of obesity (62.8%). Functional limitations and mobility aid use were notable, reflecting the extent of physical disability caused by arthritis. Importantly, pain intensity remained high across all subtypes, particularly among those with gout and RA, emphasizing the dual burden of joint degeneration and renal compromise. Comorbidities were widespread, with 63.9% having hypertension and 38% having diabetes mellitus. Despite this, bivariate and univariate analyses did not demonstrate statistically significant associations between these comorbidities and CKD presence, suggesting that other unmeasured variables or interactions between them may influence renal outcomes more significantly. Similarly, age, sex, arthritis duration, and BMI were not independently predictive of CKD in univariate regression models. These findings reinforce the notion that CKD in geriatric arthritis patients is multifactorial and may not be adequately explained by traditional risk factors alone. The high use of NSAIDs 29.17% with high exposure raises concern over potential iatrogenic renal injury, particularly in the setting of polypharmacy and reduced physiological reserve in elderly individuals. Given the non-significant associations found in chi-square and logistic regression analyses, the need for multivariable modelling becomes apparent. Complex interdependencies such as the compounding effect of inflammation, medication toxicity, and lifestyle factors may only emerge through more sophisticated statistical analyses or longitudinal tracking. Moreover, the trend observed between longer arthritis duration and more advanced CKD stages, while not statistically significant ($p = 0.0897$), suggests a possible cumulative impact of chronic disease on renal function that warrants further exploration. In summary, this study highlights a critical intersection between musculoskeletal and renal health in elderly populations. CKD i1s a common and underappreciated complication among geriatric arthritis patients, particularly those with inflammatory subtypes like gout and RA. The findings advocate for routine CKD screening in this demographic, judicious use of nephrotoxic medications, and integrated care pathways involving both rheumatologists and nephrologists. As the elderly population grows, addressing this dual burden will be essential for improving quality of life and preventing adverse health outcomes in older adults with arthritis.

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