International Journal of Research in Medical Sciences
Edakkunnummel HMA et al. Int J Res Med Sci. 2026 Aug;14(8):3374-3378
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: https://dx.doi.org/10.18203/2320-6012.ijrms20262624

Original Research Article

Clinico-epidemiological profile of chronic kidney disease patients attending a tertiary care hospital in Goa, India

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Received: 16 May 2026
Revised: 14 June 2026
Accepted: 02 July 2026

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ABSTRACT

Background: Chronic kidney disease (CKD) is a major public health problem associated with substantial morbidity and mortality. While diabetes mellitus and hypertension remain the leading causes of CKD, increasing attention is being directed toward chronic kidney disease of unknown etiology (CKDu). In Goa, particularly the southern taluka of Canacona, systematic hospital-based data on CKD are limited.
Methods: This cross-sectional study was conducted at Goa Medical College between May 2023 and April 2024. Consenting adults (>18 years) with CKD, defined according to KDIGO 2024 criteria, were enrolled. Demographic, socioeconomic, clinical, biochemical, radiological, and etiological data were collected. CKDu was defined as CKD in the absence of diabetes mellitus, long-standing hypertension sufficient to explain kidney disease, or any other identifiable cause after standard evaluation. Statistical analysis was performed using SPSS version 26.
Results: Among 345 patients, 243 (70.4%) were male, with a mean age of 55.0±14.3 years. Hypertension (93.6%) and diabetes mellitus (60.9%) were the most common comorbidities. Anemia was present in 84.6% of patients, and CKD–mineral and bone disorder abnormalities were frequent. Diabetic kidney disease and hypertensive nephropathy were the predominant etiologies. CKDu was identified in 27 patients (7.8%), with marked clustering in Canacona taluka (20 cases).
Conclusions: CKD in Goa is predominantly driven by diabetes and hypertension. However, clustering of CKDu cases in Canacona suggests a potential hotspot warranting focused surveillance and environmental investigations.

Keywords: Chronic kidney disease, Chronic kidney disease of unknown etiology, Diabetic kidney disease, epidemiology, India

INTRODUCTION

Chronic kidney disease (CKD) affects nearly 850 million people worldwide and is a leading cause of morbidity and mortality.[1] Low and middle income countries account for a significant proportion, with prevalence rates in India ranging from 10-17%.[2,3] Diabetes mellitus and hypertension remain the leading causes of CKD; however an increasing number of patients present with chronic kidney disease in the absence of traditional risk factors.[4,5]

Chronic kidney disease of unknown etiology (CKDu) has emerged as a public health issue in many parts of the world, including Central America and Sri Lanka.[6] In India, endemic regions such as Uddanam in Andhra Pradesh and parts of Odisha have been described.[7] More recently, community based observations from Goa, especially Canancona taluka in South Goa district, indicate a higher prevalence of CKD not explained by traditional risk factors.[8] Despite these concerns, systematic hospital based clinical and epidemiological data from Goa remain limited.

The present study was undertaken to describe the clinical and epidemiological profile of CKD patients attending a tertiary care centre in Goa, with emphasis on regional distribution and the identification of patients with a possible CKDu phenotype.

METHODS

Study design and setting

This is a cross-sectional observational study conducted in the Departments of Nephrology and General Medicine at Goa Medical College, a tertiary care referral centre.

Study period

This study conducted from May 2023 to April 2024.

Participants

All consenting adult patients (>18 years) diagnosed with CKD as per KDIGO 2024 guidelines, attending outpatient services or admitted during this study period, were included. Patients with acute kidney injury were excluded.[9]

Data collection

Data were collected using a structured investigator-designed proforma that included demographic details, socioeconomic status, educational status, comorbidities, clinical presentation, laboratory parameters (haematological and biochemical), imaging and histopathological findings, and etiological classification. The proforma was developed to ensure standardized data collection and was not intended as an outcome assessment tool. No validated questionnaire, scale, or scoring system was employed in the study. Diagnosis and staging of chronic kidney disease were based on the Kidney Disease: Improving Global Outcomes (KDIGO) 2024 Clinical Practice Guideline.

CKDu was defined as CKD in patients without diabetes mellitus, without long standing hypertension sufficient to explain renal dysfunction, and without other identifiable causes after routine clinical, laboratory and imaging evaluation.[10]

Sample size

The sample size was calculated using the formula for estimation of proportions with a 95% confidence level (Z = 1.96), margin of error of 6%, and population proportion of 50%. Based on the estimated population of Goa (15.59 lakh), the minimum required sample size was calculated to be 267 participants. To improve the precision and representativeness of the study, all eligible patients diagnosed with chronic kidney disease during the study period were included using universal sampling. A total of 345 patients were enrolled, exceeding the minimum required sample size.

Statistical analysis

Data were analysed using SPSS version 26. Continous variables were expressed as mean ± standard deviation and categorical variables as frequencies and percentages. Associations between categorical variables were assessed using the Chi-square test. A p value <0.05 was considered statistically significant. As no questionnaire-based outcome measure or scoring instrument was used, questionnaire validation and reliability analyses were not applicable.

RESULTS

Demographic and socioeconomic characteristics

Of the 345 patients included in the study, 243 (70.4%) were male and 102 (29.6%) were female. The mean age of the study population was 55.0±14.3 years, with the highest proportion of patients in the 61-70-year age group. Most patients were literate, and a majority belonged to above poverty line households. A significant proportion of patients belonged to lower socioeconomic strata, with socioeconomic status showing a statistically significant association with stage of CKD at presentation and patients from lower socioeconomic groups more likely to present with advanced disease.

Geographic distribution

Patients were almost equally distributed between North Goa (52.5%) and South Goa (47.8%). However, Canacona taluka in South Goa contributed a disproportionately higher number of patients with CKD of unknown etiology, with a relative predominance of female patients in this subgroup.

Comorbidities and clinical features

Hypertension was present in 93.6% of patients, while diabetes mellitus was observed in 60.9%. Ischemic heart disease was noted in 34.8%. Anemia was highly prevalent (84.6%), predominantly anemia of chronic disease. Diabetic retinopathy and hypertensive retinopathy were frequently observed reflecting long standing disease (Table 1).

Biochemical abnormalities

Hypocalcemia (68.1%) and hyperphosphatemia (53.9%) were common, reflecting a high burden of CKD mineral and bone disorder (CKD-MBD). Vitamin D deficiency was frequently observed. Poor glycemic control (HbA1c>6.5%) was seen in 26.4% of patients and dyslipidemia in 11.9%.

Table 1: Baseline clinico-epidemiological characteristics of CKD patients (n=345).

Characteristics	Number (%)
Age (years)	
<20	4 (1.2)
21-40	55 (15.9)
41-60	148 (42.9)
>60	138 (40.0)
Sex	
Male	243 (70.4)
Female	102 (29.6)
Socio-economic status	
BPL	186 (53.9)
APL	159 (46.1)
Education	
Literate	291 (84.3)
Illiterate	54 (15.7)
Comorbidities	
Hypertension	258 (74.8)
Diabetes mellitus	181 (52.5)
Heart disease	97 (28.1)
CKD stage	
Stage 3	18 (5.2)
Stage 4	64 (18.6)
Stage 5	263 (76.2)
Substance use	
Alcohol	87 (25.2)
Smoking	54 (15.7)
Over the counter and indigenous medicines	21 (6.1)

Etiology of CKD

Diabetic kidney disease (50.43%) and hypertensive nephropathy were the leading etiologies, followed by chronic glomerulonephritis (21.45%) and chronic interstitial nephritis (11%), with cases distributed across multiple talukas (Table 2).

Table 2: Etiology of CKD.

Etiology	Number	Percentage
Cystic kidney disease	4	1.16
Chronic glomerulonephritis	74	21.45
Chronic interstitial nephritis	38	11.01
Diabetic kidney disease	174	50.43
CKDu	27	7.82
Myeloma	3	0.87
Obstructive uropathy	21	6.09
Pregnancy related acute kidney injury	4	1.16
Total		100.00

CKD of unknown etiology was identified in 27 patients (7.8%). Of these, 20 patients were from Canacona taluka, two each from Sanguem and Quepem talukas, and three from North Goa district. Five of the CKDu patients presented with end stage kidney disease requiring dialysis at initial presentation and anemia was highly prevalent in this subgroup (Table 3).

Table 3: Clinical and biochemical profile of patients with CKD of unknown etiology (CKDu) (n=27).

Parameters	Number (%)
Number of patients	27
Mean age (years)	50.6
Sex	
Male	9 (25.0)
Female	18 (75.0)
Diabetes mellitus	3 (12.5)
Hypertension	15 (62.5)
CKD stage at presentation	
Stage 3-4	24 (88.89)
Stage 5	3 (11.11)
Anemia (Hb <11 g/dl)	27 (100)
Dialysis at presentation	3 (11.11)

Comparison between diabetic and non-diabetic CKD patients demonstrated that diabetic patients had a significantly higher prevalence of stage 5 CKD (81.8% vs 70.1%, p=0.01), anemia (94.5% vs 85.4%, p=0.006), serum phosphate >6.5 mg/dl (33.7% vs 16.5%, p=0.002) and hypertension (87.8% vs 60.4%, p≤0.001) compared to no-diabetic patients (Table 4).

Table 4: Comparison between diabetic and non-diabetic CKD patients.

Parameters	Diabetic (n=181), N (%)	Non-diabetic (n=164), N (%)	P value
Stage 5 CKD	148 (81.8)	115 (70.1)	0.01
Anemia present	171 (94.5)	140 (85.4)	0.006
Serum phosphate >6.5 mg/dl	61 (33.7)	27 (16.5)	0.002
Hypertension	159 (87.8)	99 (60.4)	<0.001

DISCUSSION

This hospital-based study attempts to determine the clinic-epidemiological profile of CKD patients in Goa. The demographic characteristics, including male predominance and increased prevalence in older age groups are consistent with findings from other Indian CKD cohorts.[11] Diabetes and hypertension were seen as leading contributors to CKD, which mirrors national and international data.

A strong association was noted between socioeconomic status and stage of CKD at presentation. Patients from lower socioeconomic strata were more likely to present with advanced CKD, highlighting possible delayed

seeking of healthcare access and suboptimal control of comorbidities as important determinants of disease severity.[12,13]

Anemia was highly prevalent and showed increasing severity with declining renal function.[14] Similarly, abnormalities of calcium and phosphate metabolism increased with advancing CKD stagr, implying a significant prevalence of CKD-MBD at presentation. These findings emphasise the need for earlier detection and management of CKD related complications.[15]

Patients with diabetic kidney disease demonstrated a more severe clinical profile, with higher prevalence of advanced CKD, anemia, hyperphosphatemia and hypertension compared to non-diabetic patients (Table 4). This suggests faster progression of renal manifestations in diabetes, consistent with findings reported from other studies.[16,17]

CKDu contributed to 7.82% of cases, showing geographical clustering. Twenty patients were from Canacona taluka, while two cases each were reported from Sanguem and Quepem talukas, and three additional cases from North Goa district. Unlike other CKDu endemic regions such as Sri Lanka or Central America where males predominate, our study found a higher proportion of affected females in Canacona.[18] These patients were predominantly middle-aged and had a low prevalence of diabetes mellitus. They demonstrated a high burden of anemia disproportionate to the degree of renal dysfunction, suggestive of possible tubulointerstitial pattern of kidney injury. Only a small subset of patients (five cases) required dialysis at presentation, indicating that most patients were identified before progression to end stage kidney disease.

The study also reveals that most CKDu patients belonged to long standing rural communities and were engaged in fishing or agricultural labour, mainly in cashew and areca nut plantations. The majority belonged to lower socioeconomic strata and reported limited use of personal protective equipments during occupational activities. Fertiliser use was commonly reported among agricultural workers. Information regarding domestic water sources was variable, reflecting the mixed nature of water supply in rural Goa.[19,20]

Similar patterns of clustering at community level, occupational exposure and socioeconomic characteristics have been described in CKDu affected regions elsewhere in India and other countries. These patterns may increase vulnerability through mechanisms such as recurrent dehydration, heat stress or unrecognised chronic exposures.[21] However, it is not possible to establish causal inferences due to the cross-sectional and hospital-based design of the present study.

The detection of CKDu cases beyond Canacona taluka indicates that surveillance should be carried out in talukas across the state. It may be prudent to conduct targeted screening in high-risk communities, environmental studies on water and soil contamination and preventive health measures to mitigate the increasing prevalence of CKD in Goa.

CONCLUSION

CKDu accounted for 7.82% of patients in the study, with a clear geographical clustering in Canacona Taluka and smaller numbers from neighbouring regions. However, CKD in Goa is largely driven by diabetes mellitus and hypertension, which is consistent with national and international trends. These findings suggest the presence of a possible CKDu phenotype in southern Goa and highlight the need for targeted community screening and further epidemiological and environmental studies. These measures are essential to address the CKD burden and formulate preventive public health strategies.

ACKNOWLEDGEMENTS

Authors would like to thank the staff of the Departments of Nephrology and General Medicine at Goa Medical College for their support in data collection and patient management. We also express our gratitude to all the patients who participated in this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Edakkunnummel HMA, Tiwari JP, Habib M, Tyagi S, Bhatlawande T, Kar B, et al. Clinico-epidemiological profile of chronic kidney disease patients attending a tertiary care hospital in Goa, India. Int J Res Med Sci 2026;14:3374-8.