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JCN ISSN 2576-9529 JOURNAL OF CLINICAL NEPHROLOGY

Research Article

Clinico-epidemiological Profile, Comorbidities, Prevailing Practices in the Management of Hyperuricemia and Patient Outcomes with Various Urate Lowering Therapies: Capital Registry Data

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Submitted: June 05, 2026
Accepted: June 20, 2026
Published: June 22, 2026

Citation: Jasuja S, Hiremath S, Nagaraju SP, Balwani M, Pasari A, Bhojaraja MV, et al. Clinico-epidemiological Profile, Comorbidities, Prevailing Practices in the Management of Hyperuricemia and Patient Outcomes with Various Urate Lowering Therapies: Capital Registry Data. J Clini Nephrol. 2026; 10(6): 50-57. Available from: https://dx.doi.org/10.29328/journal.jcn.1001176

Keywords: Chronic kidney disease; eGFR; Hyperuricemia; Serumuric acid

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Abstract

Background: The absence of standardized protocols for managing hyperuricemia (HU) in chronic kidney disease (CKD) patients in India highlights the need to examine current practices. This registry assessed clinico-epidemiological data, treatment strategies, and outcomes with urate-lowering drugs (ULD) in CKD stages 2 to 4 across India.

Methods: This observational registry included 251 CKD patients with HU across five centers over 12 months. Primary endpoints were demographic data, CKD stages, and comorbidities. Secondary endpoints included percentages of patients on treatment (ULD, lifestyle modification [LSM], or both) and their impact on kidney function tests (KFTs). Comparisons were made between therapies (LSM vs. LSM+ULD) and comorbidity subgroups.

Results: Among 251 CKD patients, 48.6% had stage 4 CKD, and 58.2% had SUA levels 6-8 mg/dL (mean age: 46.77 years; 69.7% men). Hypertension (90%) was most common, followed by diabetes (41%).

At 12 months, mean SUA reduction was significant (-2.36 ± 1.85). Similar reductions occurred in patients with comorbidities: diabetes (-2.52 ± 1.83), hypertension (-2.39 ± 1.86), diabetes + hypertension (-2.51 ± 1.84) and others (-2.83 ± 2.06). Reduction was greater in patients treated with LSM+ULD (-2.89 ± 1.64) compared to LSM alone (-0.62 ± 1.69).

A significant eGFR increase was noted overall, with ULD+LSM group showing higher eGFR (15.21 ± 25.61) than LSM-only group (-1.26 ± 10.41). Seventeen adverse events (AEs) and three serious AEs were reported, all except one were unrelated.

Conclusion: The study highlights younger onset, male predominance, and higher ULD use in Indian CKD patients with hyperuricemia, supporting potential benefit of ULD+LSM in the management of CKD.

Introduction

Hyperuricemia (HU) is defined as increased serum uric acid (SUA) levels exceeding the saturation level of 6.8 mg/dL at 370 C and pH 7 [1]. It may be symptomatic (gout, urolithiasis, acute urate nephropathy) or asymptomatic (elevated SUA without symptoms) [2]. HU is strongly associated with chronic kidney disease (CKD), hypertension (HTN), type 2 diabetes (T2DM), obesity, heart failure, and cardiovascular disease (CVD) [3]. It is also a mortality indicator in individuals with coronary artery disease, chronic obstructive pulmonary disease, and terminal cancers [4]. Multiple studies have confirmed elevated SUA as an independent risk factor of CVD incidence and mortality [5,6].

HU results from increased uric acid synthesis, reduced excretion, or both. About one-third of SUA originates from dietary purines, while the rest is endogenous [7].

Over the past 40 years, HU prevalence has gradually increased worldwide, with India reporting ~25.8%. [8,9]. Management includes lifestyle modifications and urate lowering drugs (ULDs).

KDIGO guidelines recommend intervention for symptomatic HU [10]. Dietary modifications such as limiting fructose, sugar-sweetened beverages, and red meat, may delay CKD progression. ULD like allopurinol also delay disease progression [11,12]. They are recommended for CKD, diabetes, CVD, heart failure patients to reduce mortality.

Updated recommendations from the American College of Rheumatology (ACR) [13]. The British Society for Rheumatology [14] and Japanese Guidelines [15] recommend using ULDs in asymptomatic HU only with added risk factors like CKD (especially stages 2-4).

However, there is no global consensus on how to treat asymptomatic HU. Further research on long-term ULD effects in high risk populations is needed [13]. Studies involving CKD patients on ULD have shown varying results, likely due to small sample sizes, brief follow-up, heterogeneous study designs, and varying CKD definitions.

Although current CKD guidelines do not prescribe treating HU without gout, emerging recognition supports a causative link [16,17]. Japanese guidelines partially recommend ULDs for HU patients with CKD to prevent deterioration of renal function, but not in hypertension or heart failure. [15]

Primary urate-lowering therapy involves xanthine oxidase inhibitors like allopurinol or febuxostat. Allopurinol therapy can cause Stevens-Johnson syndrome as a side effect. Febuxostat is a non-purine xanthine oxidase inhibitor, is not associated with Stevens-Johnson- syndrome; it does not require dose adjustment in CKD. It may lower SUA levels more effectively [18].

Despite extensive literature on uricostatic and uricosuric medications, treatments given alter with time. Data on Indian CKD patients with HU remain minimal, particularly regarding clinico-epidemiological and treatment patterns. This study prospectively monitored HU in India, assessing prevalence, demographics, comorbidities, SUA levels, treatment and renal function patterns. Findings aim to guide medical professionals in tailoring optimal treatment strategies for patients with HU and other comorbidities.

Materials and methods

Study design

This was a non-interventional, multi-centre, prospective observational registry study conducted across five sites in India. The study aimed to evaluate the prevalence of HU in CKD patients and to assess clinical characteristics, comorbidities, and patient demographics, and existing therapeutic strategies. The patients were followed for 12 months to evaluate disease progression and treatment impact. The data was categorized according to patients' therapies (patients on LSM or ULD) and across comorbidities (DM, HTN, DM+HTN and others).

The Institutional Ethics Committee of all five study sites examined the clinical study protocol and other study documents and provided the approval letter to conduct the study. Every patient provided written informed consent before enrolment.

Setting

Eligible patients were recruited from outpatient departments at Sanjeev Clinic, Bengaluru; Apollo Hospital, New Delhi; Rukmini Hospital, Jaipur; Kasturba medical college, MAHE, Manipal, and Saraswati Kidney Care Centre, Nagpur. Patients were requested to attend follow- up visits at 3, 6 and 12 months for data collection. The study period extended from 23 JUL 2021 to 19 OCT 2023.

Eligibility criteria

Patients aged 18 to 65 years with CKD stages 2, 3A, 3B, or 4 (as per CKD Clinical Practice Recommendations for Primary Care Physicians and Healthcare Providers) and elevated SUA levels (> 7 mg/dL [420 µM] in males and > 6 mg/dL [360 µM] in women) were included.

Exclusion criteria included patients with a reduced life expectancy (e.g., < 6 months); recent conditions impairing participation, pregnant or lactating women, patients requiring long-term glucocorticoids, or with severe infections (excluding diabetic foot) or immune dysfunction.

The planned study duration was 24 months. However, it was terminated early at 12 months due to the dropout rate at later follow-up visits. Up until then, sufficient data was also acquired. Data of 251 eligible patients were collected.

They were followed up at regular intervals [3 months (172 subjects), 6 months (154 subjects) and 12 months (138 subjects) (Figures 1,2).

Study endpoints

The primary endpoint of the study was to check prevalence of HU with stage 2-4 along with collection of demographic data and clinical characteristics, including the percentage of CKD patients as per duration (≤ 2 years, 2–5 years, > 5 years) and percentage of CKD patients with SUA levels (6-8 mg/dL, 8-10 mg/dL and >10 mg/d) at baseline with HU and comorbidities. Secondary end points included the impact of HU treatment on KFT parameters over time, categorized by treatment group (ULD+LSM and LSM) and by comorbidities (DM, HTN, DM+HTN, and other conditions).

Study assessments

Patients' demographic and baseline data, anthropometric data, medical/surgical history including CKD and comorbidities were collected during screening. Follow-up assessments included detailed documentation of KFT parameters, treatment adherence, comorbidity status and any concomitant medications. Changes in these parameters were analyzed statistically from baseline to 3, 6, and 12 months.

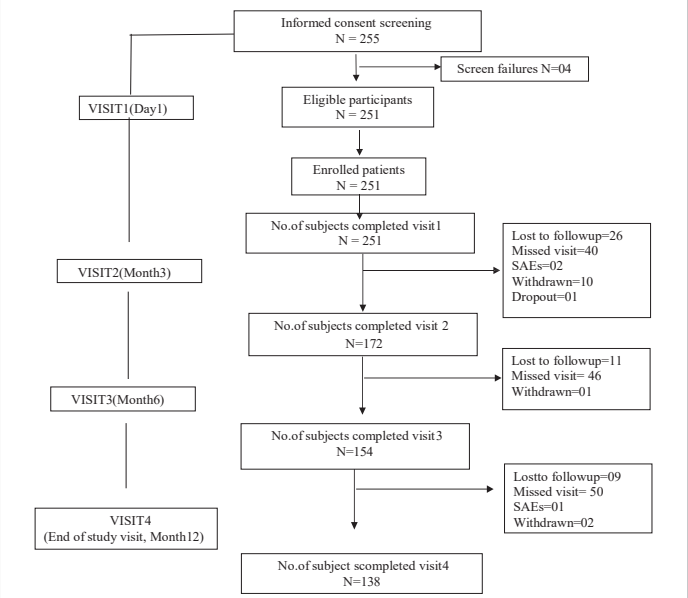

Figure 1: Patient disposition.

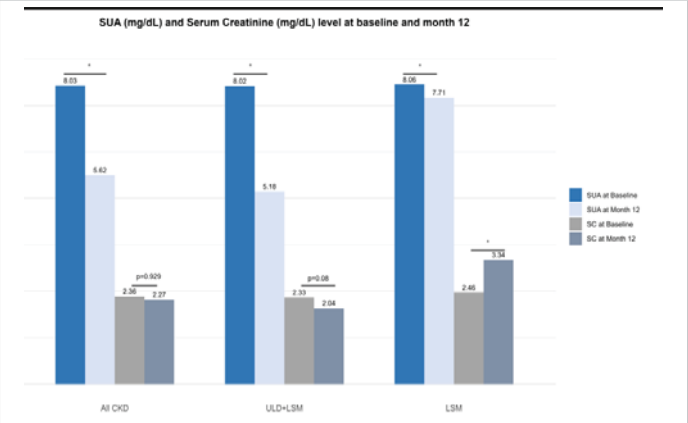

Figure 2: Change in SUA and serum creatinine from baseline to 12 months. CKD: Chronic Kidney Disease; ULD: Urate-Lowering Drug; LSM: Lifestyle Modification; SUA: Serum Uric Acid; SC: Serum Creatinine

Bias

To minimize bias, data was captured prospectively in compliance with standard clinical trial processes to reflect real-world settings. The study employed a multi-centric deign with sites from different geographical locations. Additionally, analyses were stratified by treatment and comorbidity groups to reduce confounding.

Study size

The study was observational and exploratory in nature. Thus, no formal sample size calculation was performed. A total of 251 patients who met the eligibility criteria and consented were included, which was further considered sufficient to provide descriptive insights into study endpoints.

Statistical analysis

All collected data from the enrolled patients obtained as per protocol were used for summary/analysis. Considering extended duration of the follow-up study, data analysis and reporting were divided into two steps: once 50% of the subjects completed the study (with a 6- month follow-up) and again after 100% of the subjects completed the study (with a 12-month follow-up). Continuous variables were summarized using descriptive statistics such as n, mean, standard deviation, median, minimum and maximum values. Categorical data were summarized using numbers, percentages, and 95% confidence intervals. Missing data was not imputed.

Statistical tests were conducted at a 5% level of significance. For change from baseline summaries, the baseline value was the value recorded during the baseline visit. Statistical analysis was carried out with SPSS version 29.0.0.0 and R version 4.3.2. Paired t test was used for analyzing changes in KFT parameters from baseline to 3, 6 and 12 months.

Results

Patient demographics and baseline characteristics

a. Demographics

A total of 251 eligible patients were enrolled. Baseline demographics are presented in Table 1.

b. Baseline characteristics

1. CKD stage, duration and SUA level

Among 251 patients, 122(48.6%) had stage 4 CKD, 49

Table 1: Patient demographics

Characteristics	Overall (N=255)
AGE	
N	251
Mean	46.77
SD	49.00
Median	11.53
Min; Max	(19, 65)
GENDER, n (%)	
Female	76 (30.3%)
Male	175 (69.7%)
ANTHROPOMETRY Weight (kg)	
N	251
Mean	69.58
SD	68
Median	14.98
Min; Max	(37.81 116.2)
Height (m)	
N	251
Mean	163.75
SD	163
Median	8.96
Min; Max	(139.7, 190.0)
BMI (kg/m^2)	
N	251
Mean	25.89
SD	25.64
Median	4.93
Min, Max	(15.8, 47.2)
ETHNICITY, n (%)	
Indian	251 (100.0%)
EDUCATION CATEGORIES n (%)	251 (100.0%)
Illiterate	6 (2.4%)
Primary school certificate	7 (2.8%)
Middle school certificate	32 (12.8%)
High school certificate	58 (23.1%)
Intermediate or diploma	19 (7.6%)
Graduate	117 (46.6%)
Profession	12 (4.8%)
OCCUPATION, n (%)	251
Unemployed	83 (33.1%)
Elementary occupation	18 (7.2%)
plant and machine operators/assemblers	10 (4.0%)
Craft & related trade workers	6 (2.4%)
Skilled agricultural/fishery workers	14 (5.6%)
Skilled workers/shop and market sales workers	40 (15.9%)
Clerks, technicians/associate professionals	20 (8.0%)
Professionals	52 (20.7%)
Legislators/senior officials/manager	8 (3.2%)
LIFESTYLE HABITS	
Smoking, n (%)	
Current	15 (6.0%)
Former	19 (7.6%)
Never	217 (86.5%)
Alcohol consumption, n (%)	
Current	25 (10.0%)
Former	25 (10.0%)
Never	201 (80.0%)
Dietary habits, n (%)	
Vegetarian	109 (43.4%)
Both Vegetarian & Non-vegetarian	142 (56.6%)

SD: Standard Deviation; N: Total number; n: number in the category

(19.5%) had stage 3B, 42 (16.7%) stage3A and 38 (15.1%) stage 2. Baseline SUA levels were 6-8 mg/dL in 58.2%, 8-10 mg/dL in 35.5%, and >10 mg/dL in 6.4%. Most patients (44.2%) had CKD for ≤ 2 years, while 31.9% had > 5 years (Table 2).

2. Comorbidities

Majority of the patients had HTN (90.0%), followed by DM (41.0%), DM+HTN (38.2%) and other comorbidities (32.3%) (Table 2).

3. Treatment distribution

At baseline, 79.3% received ULD+ LSM, 20.7% were on LSM alone. By the end of study, the proportion of patients on ULD+LSM increased to 82.6% (Table 3).

Impact of treatment on KFT parameters

In the overall CKD group, mean serum urea, creatinine, BUN decreased by month 12, though changes were not statistically significant.

The mean SUA decreased from 8.03 (1.2) at baseline to 5.62 (1.81) at month 12, exhibiting a statistically significant reduction (p = < 0.001). Mean eGFR increased from 37.02(18.95) at baseline to 49.5(28.86) at month 12, also statistically significant (p < 0.001).

Across comorbidity subgroups, significant decrease in mean baseline readings of serum urea, serum creatinine, BUN were observed. Mean eGFR levels were found to be significantly higher (p = < 0.001) at month 12 in all these subgroups (Table 4).

Subgroup analysis: ULD+LSM and LSM only

All subjects received LSM. Among those prescribed ULD received either Febuxostat (80.4%) or Topiroxostat (2.2%), remaining 17.4% patients were on LSM alone.

A statistically significant reduction in mean serum urea, SUA and BUN values was observed in ULD+LSM subgroup. On the contrary LSM only group showed increased mean serum urea and creatinine at month 12. Mean eGFR values increased significantly at month 12 compared to baseline in the ULD+LSM subgroup, whereas a decline was noted in the LSM only subgroup.

Intragroup comparisons confirmed significant reductions in serum urea, SUA, BUN, and a greater eGFR improvement in the ULD+LSM, compared to the patients on LSM alone at Month 12 (Table 4, Figure 3).

Safety

Seventeen adverse events (AEs) were reported by 13 patients, including 3 serious adverse events (SAEs). Only one AE was possibly related (ADR) to prescribed therapy.

Table 2: Percentage ofCKD patients withhyperuricemiaby CKD stages, duration,SUA level and comorbidities.

Characteristics		ULD + LSM (N=199)	Lifestyle modification (N=52)	Overall (N=251)
CKD stages	HU (SUA level), n (%)			
2	6–8 mg/dL	22 (11.1%)	3 (5.8%)	25 (10.0%)
	8–10 mg/dL	12 (6.0%)	1 (1.9%)	13 (5.2%)
	>10 mg/dL	0 (0.0%)	0 (0.0%)	0 (0.0%)
		34 (17.1%)	4 (7.7%)	38 (15.1%)
3A	6–8 mg/dL	20 (10.1%)	3 (5.8%)	23 (9.2%)
	8–10 mg/dL	13 (6.5%)	4 (7.7%)	17 (6.8%)
	>10 mg/dL	2 (1.0%)	0 (0.0%)	2 (0.8%)
		35 (17.6%)	7 (13.5%)	42 (16.7%)
3B	6–8 mg/dL	25 (12.6%)	5 (9.6%)	30 (11.9%)
	8–10 mg/dL	9 (4.5%)	3 (5.8%)	12 (4.8%)
	>10 mg/dL	5 (2.5%)	2 (3.8%)	7 (2.8%)
		39 (19.6%)	10 (19.2%)	49 (19.5%)
4	6–8 mg/dL	50 (25.1%)	18 (34.6%)	68 (27.1%)
	8–10 mg/dL	36 (18.1%)	11 (21.2%)	47 (18.7%)
	>10 mg/dL	5 (2.5%)	2 (3.8%)	7 (2.8%)
		91 (45.7%)	31 (59.6%)	122 (48.6%)
Duration of CKD				
	≤ 2 years	72 (36.2%)	39 (75.0%)	111 (44.2%)
	2–5 years	53 (26.6%)	7 (13.5%)	60 (23.9%)
	> 5 years	74 (37.2%)	6 (11.5%)	80 (31.9%)
SUA Levels				
	6–8 mg/dL	117 (58.8%)	29 (55.8%)	146 (58.2%)
	8–10 mg/dL	70 (35.2%)	19 (36.5%)	89 (35.5%)
	>10 mg/dL	12 (6.0%)	4 (7.7%)	16 (6.4%)
Comorbidities				
	DM	74 (37.2%)	29 (55.8%)	103 (41.0%)
	HTN	179 (89.9%)	47 (90.4%)	226 (90.0%)
	DM + HTN	70 (35.2%)	26 (50.0%)	96 (38.2%)
	Other comorbidities	70 (35.2%)	11 (21.2%)	81 (32.3%)

Table 3: Summary of CKD patients on hyperuricemia treatment.

Characteristics	Visit	Values
HU treatment		
Visit-1		
N		251
Urate lowering drugs, n (%)		199(79.3%)
Febuxostat, n (%)		196 (78.1%)
Topiroxostat, n (%)		3 (1.2)
Lifestyle modification, n (%)		52(20.7%)
Visit-2		
N		172
Urate lowering drugs, n (%)		130(75.6%)
Febuxostat, n (%)		127 (73.8%)
Topiroxostat, n (%)		3 (1.7%)
Lifestyle modification, n (%)		42(24.4%)
	Visit-3	
N		154
Urate lowering drugs, n (%)		121(78.6%)
Febuxostat, n (%)		118 (76.6%)
Topiroxostat, n (%)		3 (1.9)
Lifestyle modification, n (%)		33(21.4%)
	Visit-4	
N		138
Urate lowering drugs, n (%)		114(82.6%)
Febuxostat, n (%)		111 (80.4)
Topiroxostat, n (%)		3 (2.2)
Lifestyle modification, n (%)		24(17.4%)

Percentage is computed using N provided for each visit
HU – Hyperuricemia. All patients were on lifestyle modification

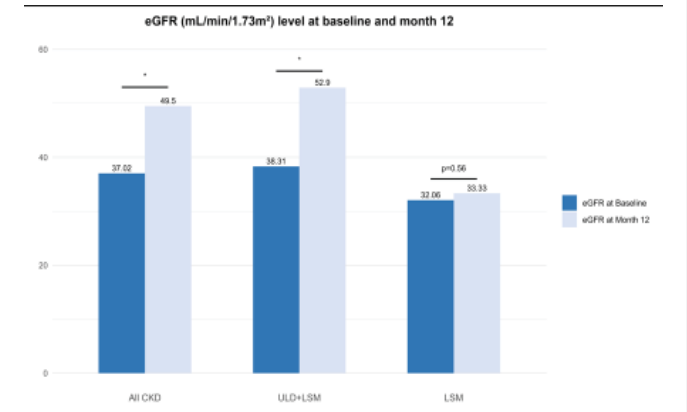

Figure 3: Changein eGFR level from baseline to 12 months.
*p < 0.05 is considered as statistically significant. p - values are based on paired-t test. CKD: Chronic Kidney Disease; ULD: Urate-Lowering Drug; LSM: Lifestyle Modification; eGFR: estimated Glomerular filtration rate

Discussion

The loss of renal function in CKD is irreversible, but it can be delayed through management of nutritional and metabolic factors, thus slowing disease progression and improving life expectancy. This is important particularly in countries with limited access to renal replacement therapy [19]. In India, there are no clear guidelines for treating HU in CKD patients. Therefore, it is essential to explore prevailing

Table 4: Summary table of s. urea, s. creatinine, SUA, BUN and eGFR of overall CKD patients, urate lowering drugs + lifestyle modification and lifestyle modification alone population

	Mean (SD)				Change from baseline						
Visits →	Baseline	3 months	6 months	12 months	Baseline	3 months	*p* value	6 months	*p* value	12 months	*p* value
Overall CKD patients											
SU	52.11	53.3	52.73	49.17	-	0.67	0.725	-1.36	0.566	-3.6	0.128
	(± 23.35)	(± 28.77)	(± 29.38)	(± 30.67)		(± 24.85)		(± 29.32)		(± 27.55)	
SC	2.36	2.3	2.36	2.27	-	0.03	0.682	0.03	0.769	-0.01	0.929
	(± 0.98)	(± 1.29)	(± 1.55)	(± 1.83)		(± 0.98)		(± 1.35)		(± 1.53)	
SP	6.89	7.01	7.05	7.02	-	0.05	0.35	0.1	0.043*	0.04	0.445
	(± 0.68)	(± 0.71)	(± 0.74)	(± 0.66)		(± 0.63)		(± 0.63)		(± 0.67)	
SUA	8.03	6.04	5.98	5.62	-	1.91	<0.001*	2.06	<0.001*	2.36	<0.001*
	(± 1.2)	(± 1.87)	(± 2.03)	(± 1.81		(± 1.92)		(± 1.99)		(± 1.85)	
BUN	24.89	25.16	24.76	23.03	-	0.22	0.808	0.54	0.612	-2.09	0.071
	(± 10.65)	(± 13.93)	(± 13.6)	(± 14.3)		(± 11.76)		(± 13.11)		(± 13.1)	
eGFR	37.02	42.2	44.35	49.5	-	4.95	<0.001*	8.82	<0.001*	12.35	<0.001*
	(± 18.95)	(± 23.7)	(± 25.94)	(± 28.86)		(± 15.93)		(± 20.99)		(± 24.47)	
CKD patients receiving urate lowering drugs + lifestyle modification											
SU	52.28	52.51	50.51	47.59	-	-0.58	0.798	-4.57	0.08	-6.32	0.015*
	(± 24.32)	(± 29.8)	(± 27.73)	(± 30.14)		(± 25.79)		(± 28.49)		(± 27.36)	
SC	2.33	2.25	2.15	2.04	-	0.03	0.748	-0.13	0.226	-0.22	0.08
	(± 1.02)	(± 1.35)	(± 1.36)	(± 1.56)		(± 1.06)		(± 1.2)		(± 1.3)	
SP	6.89	7.02	7.08	6.96	-	0.05	0.42	0.13	0.025*	0.02	0.751
	(± 0.66)	(± 0.65)	(± 0.68)	(± 0.66)		(± 0.64)		(± 0.64)		(± 0.67)	
SUA	8.02	5.52	5.54	5.18	-	-2.39	<0.001*	-2.46	<0.001*	-2.75	<0.001*
	(± 1.18)	(± 1.73)	(± 1.95)	(± 1.5)		(± 1.91)		(± 1.99)		(± 1.73)	
BUN	25.31	24.88	23.75	22.3	-	-0.63	0.571	-2.23	0.052	-3.53	0.006*
	(± 11.12)	(± 14.55)	(± 12.8)	(± 14.05)		(± 12.32)		(± 12.5)		(± 13.01)	
eGFR	38.31	44.92	47.75	52.9	-	6.01	<0.001*	11.43	<0.001*	15.21	<0.001*
	(± 19.59)	(± 24.88)	(± 26.36)	(± 29.09)		(± 17.68)		(± 21.9)		(± 25.61)	
CKD patients treated only with lifestyle modification											
SU	51.47	52.51	61.16	56.69	-	4.53	0.18	10.76	0.049*	56.69	0.082
	(± 19.35)	(± 25.89)	(± 34.09)	(± 32.66)		(± 21.48)		(± 29.67)		(± 32.66)	
SC	2.46	2.45	3.15	3.34	-	0.03	0.756	0.65	0.036*	0.96	0.036*
	(± 0.87)	(± 1.05)	(± 1.95)	(± 2.54)		(± 0.68)		(± 1.69)		(± 2.11)	
SP	6.89	6.97	6.95	7.2	-	0.04	0.642	-0.005	0.964	0.15	0.266
	(± 0.76)	(± 0.87)	(± 0.92)	(± 0.64)		(± 0.6)		(± 0.57)		(± 0.65)	
SUA	8.06	7.66	7.58	7.71	-	-0.42	0.009*	-0.61	0.007*	-0.53	0.041*
	(± 1.29)	(± 1.25)	(± 1.43)	(± 1.72)		(± 0.99)		(± 1.2)		(± 1.19)	
BUN	23.57	26.05	28.58	26.49	-	2.71	0.076	5.81	0.022*	4.35	0.082
	(± 8.99)	(± 11.91)	(± 15.93)	(± 15.26)		(± 9.68)		(± 13.62)		(± 11.73)	
eGFR	32.06	33.79	31.5	33.33	-	1.69	0.17	-1.07	0.652	-1.26	0.56
	(± 15.41)	(± 17.3)	(± 19.83)	(± 22.25)		(± 7.82)		(± 13.27)		(± 10.41)	

Note: SU: Serum Urea; SC Serum Creatinine; SP: Serum Protein; BUN: Blood Urea Nitrogen; eGFR: estimated Glomerular Filtration Rate; *p* value based on paired *t* test; *Significant *p* value

practices across regions. Our study aims to address this gap by studying management strategies and outcomes in Indian CKD patients with elevated SUA.

Most enrolled patients had stage 4 CKD, with SUA levels between 6-8 mg/dL, and CKD < 2 years. HTN was the most common comorbidity, highlighting the need for targeting management strategies addressing elevated SUA levels and comorbidities. At baseline, ULD+LSM use was maximum, and increased further by study end. These findings emphasize the importance of establishing treatment protocols to manage HU and prevent CKD progression.

Several prospective studies stratified patients by SUA levels and revealed a favourable connection with CKD occurrence [20-24]. In a registry of 48,000 Japanese patients followed for 7 years, Iseki, et al. reported HU significantly increased the risk of end-stage kidney disease after controlling serum creatinine and other variables [25]. Similar trends were observed in National Health and Nutrition Examination Survey (NHANES) 2007–2008 analysis of 5,707 patients, which revealed an exponential SUA-CKD relationship [26]. A community study of 13,338 participants identified elevated UA level as an independent risk factor for CKD progression and mortality [27]. Prezelin-Reydit M, et al. further emphasized the risk of kidney failure rises with SUA, plateauing at 6-10 mg/dl and increase sharply above 11 mg/dl [28].

In NHANES 2001-2018, HU with HTN was linked to increased risk of cardiovascular and all- cause mortality [29]. Collectively, these studies confirm SUA as a key factor in CKD progression and mortality, particularly in patients with comorbidities.

Our non-interventional, multicenter, observational study compared SUA changes in overall CKD patients and in those with comorbidities. Indicators of CKD progression, like SUA, eGFR, serum creatinine, blood urea etc., were analyzed. The current study demonstrated a statistically significant decrease in serum urea and SUA along with increased eGFR over 12- months, suggesting improved kidney function in both overall CKD and comorbidity subgroups (DM, HTN, DM+HTN, others).

Unlike LSM alone, patients on ULD+LSM showed significant increase in eGFR and decrease in serum urea, SUA and serum creatinine.

Weis L, et al. observed improved GFR was associated with a decrease in metabolic problems over time, indicating renal function improvement [30]. Traditionally eGFR is considered a more accurate measure of renal health than serum creatinine [31,32].

In current study, eGFR increased significantly in overall CKD patients, with ULD+LSM subgroup suggesting a slow progression of CKD than LSM alone. LSM patients displayed an insignificant declining eGFR trend.

Goicoechea, et al. [33] observed an inverse SUA-eGFR correlation. After 59 months of follow-up in 900 healthy adults, higher SUA predicted greater eGFR reduction [34]. The findings of our observational study are consistent with the findings mentioned above.

A systematic MEDLINE review of randomized controlled trials comparing renal events in non- dialyzed CKD patients showed ULT tend to preserve eGFR better, though not significantly [35].

Enhanced kidney functioning with ULD+LSM implied significant improvements in eGFR and reductions in SUA, serum creatinine and BUN. Subgroup analysis clarified the therapeutic effects, though larger sample sizes are required to validate these results. The study employed real-world, multicenter data from five major Indian cities, increasing the representativeness of urban and semi-urban CKD populations, making the results more reflective of routine clinical practice.

Nevertheless, certain limitations stem from its observational nature, including varied laboratory acquisition, compliance problems and the inability to fully exclude bias. While the multicentre approach improves generalizability within urban India, rural and underserved populations remain underrepresented, limiting extrapolation.

Furthermore, the overall sample size of 251 patients, coupled with an imbalance in treatment distribution (79.3% in the HU treatment + LSM group and 20.7% in LSM-only group), limits the statistical power for subgroup analyses and reduces the likelihood of detecting rare outcomes. Despite these constraints, the findings add valuable real-time insights into HU management in Indian CKD patients, highlighting areas for further research.

Conclusion

The study highlights a higher preference for urate lowering drugs among Indian nephrologists. Additionally, Indian CKD patients with hyperuricemia tend to have a younger age onset with a greater prevalence in males. The findings of the study underscore the synergistic effects of combining urate-lowering medications with lifestyle modifications in improving renal function and mitigating the progression of the disease.

Declarations

Acknowledgement

The authors acknowledge Ketham Karunakar Likitha, Lead Medical Writer at IDD Research Solutions for Medical Writing Support.

The authors also thank the entire IDD Research Solutions team for their contributions in Clinical Operations, Project Management, Data Management and Biostatistics.

Funding: This study was sponsored by Abbott Healthcare Pvt. Ltd.

Conflict of interest: Dr. Sanjiv Jasuja, Dr. Sanjeev Hiremath, Dr. Shankar Prasad & Dr. Manish Balwani, Dr. Amit Pasari, Dr. Mohan V Bhojaraja received research grants from Abbott for conduct of the study.

Dr. Yogesh Sharma, Dr. Deepa Sholapuri, Dr. Shivani Acharya, Dr. Rhutuja Rane are the employees of Abbott Healthcare Private limited.

Ethical approval: Institutional Ethics Committees (IEC) of each study site (ACE ICE, Royal Pune IEC, Kasturba Medical College and hospital IEC, Criti Care Hospital and research IEC and Apex Hospital IEC) reviewed and approved the clinical study protocol and other study- related documents. All patients provided written informed consent before their participation in the study.

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