RESEARCH PAPER

Evaluation of Lifestyle Determinants Influencing Chronic Kidney Disease Among Hospitalized Patients

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ABSTRACT

Chronic Kidney Disease (CKD) is a progressive and irreversible decline in renal function, commonly associated with comorbidities such as diabetes mellitus and hypertension. Patients undergoing maintenance haemodialysis experience a high burden of complications and require complex pharmacotherapy, often leading to polypharmacy and increased risk of adverse drug reactions (ADRs), affecting patient outcomes and quality of life.

Aim & Objectives: To evaluate socio-demographic and clinical characteristics of CKD patients on maintenance haemodialysis; to identify major risk factors and complications; to assess pharmacotherapeutic patterns; and to analyse prescribing practices using WHO indicators.

Methods: A cross-sectional observational study was conducted over six months (Oct 2025 – Mar 2026) at SVRRGGH, Tirupati, including 128 CKD patients. Data were collected using a structured form and analysed using descriptive statistics.

Results & Discussion: Most patients were male (77%) and aged 50–59 years (32%). Hypertension (87%) and diabetes (60.15%) were common. Risk factors included alcohol (28%) and smoking (15%). Severe renal impairment (eGFR <15 mL/min/1.73 m²) was noted. Common complications were shortness of breath (59%), muscle cramps (23%), pedal edema (34%), and lower limb swelling (27%). Frequently used drugs included loop diuretics (86%), antibiotics (87%), alkalinizing agents (80%), and antihypertensives (79%). Cilnidipine and ceftriaxone were most prescribed. Average drugs per prescription: 6.7. WHO indicators showed 81% generic and 71% NLEM prescribing.

Conclusion: CKD patients on haemodialysis show high comorbidity, complications, and polypharmacy. Rational prescribing was observed, but regular monitoring, guideline adherence, and clinical pharmacist involvement are essential to improve outcomes.

Keywords: Chronic Kidney Disease, Haemodialysis, Polypharmacy, Comorbidities, Risk Factors, Pharmacotherapy, WHO Indicators.

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Introduction

Chronic Kidney Disease (CKD) is a progressive and irreversible condition characterized by structural or functional abnormalities of the kidneys persisting for more than three months. It has emerged as a major global public health challenge due to its increasing prevalence, associated morbidity and mortality, and substantial healthcare burden. CKD affects millions of individuals worldwide and is recognized as one of the leading causes of premature death and disability[1,2]. The kidneys play a crucial role in maintaining fluid and electrolyte balance, regulating blood pressure, and eliminating metabolic waste products. Progressive decline in kidney function can lead to complications such as hypertension, anemia, cardiovascular diseases, mineral and bone disorders, and ultimately end-stage renal disease (ESRD), requiring dialysis or kidney transplantation[3].

The rising prevalence of CKD is largely attributed to the growing burden of non-communicable diseases, particularly diabetes mellitus, hypertension, and obesity. In addition to these medical conditions, lifestyle-related factors such as unhealthy dietary habits, physical inactivity, tobacco use, alcohol consumption, inadequate sleep, and poor stress management significantly contribute to the

development and progression of CKD[1,4]. These determinants are modifiable and therefore represent important targets for preventive interventions.

In India, rapid urbanization, changing dietary patterns, sedentary lifestyles, and increasing life expectancy have contributed to the growing burden of CKD[4,5]. Limited awareness, delayed diagnosis, and inadequate access to healthcare services further aggravate disease outcomes. Socioeconomic factors, educational status, and healthcare accessibility also influence health behaviors and disease progression among CKD patients.

Several studies have identified associations between lifestyle factors and CKD; however, region-specific evidence remains limited, particularly in tertiary care settings[6,7]. Understanding the lifestyle determinants among CKD patients is essential for developing effective prevention strategies, promoting early intervention, and improving patient outcomes. Identification of modifiable risk factors can help healthcare professionals provide targeted patient education and support behavioral changes that may slow disease progression. Therefore, this study aims to analyse the lifestyle determinants among CKD patients attending a tertiary care teaching hospital and their association with disease severity[8].

Methodology: A prospective observational study was conducted in the Department of General Medicine, SVRRGGH, Tirupati, over a period of six months (October 2025 to March 2026) among 120 patients diagnosed with chronic kidney disease (CKD). Adult patients aged 18 years and above who were willing to provide informed consent were included in the study, while patients with acute kidney injury, pregnant women, and those unwilling or unable to participate were excluded. Data were collected using a specially designed proforma containing information on demographic characteristics, clinical history, comorbidities, lifestyle factors such as smoking, alcohol consumption and tobacco use, laboratory investigations, and prescribed medications. The collected data were compiled, tabulated, and analysed using appropriate statistical methods to assess the association between lifestyle determinants and CKD severity[9].

Results:

Out of the total 120 patients included in the study, the majority were male patients, accounting for 93 (77.5%), while female patients constituted 27 (22.5%) of the study population. The age-wise distribution of patients showed that the majority of CKD patients belonged to the 51–70 years age group, comprising 69 patients (57.5%). This was followed by the 30–50 years age group with 33 patients (27.5%). A smaller proportion of patients were observed in the 71–90 years category, accounting for 15 patients (12.5%), while only 2 patients (1.67%) were below 30 years of age. The least number of patients was recorded in the above 90 years age group, with 1 patient (0.83%).

Table 1: Distribution of various variables among the study population:

Characteristics	Variables	Number of patients(n=120) (%)
Gender	Male	93(77.5)
	Female	27(22.5)
Age	<30 yrs	2(1.67)
	30-50yrs	33(27.5)
	51-70yrs	69(57.5)
	71-90yrs	15(12.5)
	Above 90 yrs	1(0.83)
Duration of disease	<1yr	10 (8.3)
	1-2 yrs	57 (47.5)
	3-4yrs	32 (26.7)
	5-10yrs	20 (16.67)
	>10yrs	1 (0.83)
Co-morbidities	Diabetes mellitus	8 (6.67)
	Hypertension	18 (15)
	Diabetes mellitus with hypertension	56 (46.67)
	Other diseases	9 (7.5)
	People with no co morbidities	29 (24.16)
Social habits	Smoking	20 (16.67)
	Chewing (Tobacco, betelnut)	8 (6.67)
	Alcohol intake	12 (10)
	Smoking and alcohol	40 (33.33)
	Chewing and alcohol	2 (1.67)
	Smoking and chewing	12 (10)
	Patients with no social habits	26 (21.67)
Clinical status CKD Stage	1(>90ml/min)	6 (5)
	2(60-89ml/min)	42 (35)
	3(30-59 ml/min	7 (5.83)

	4(15-29 ml/min)	22 (18.33%)
	5(<15ml/min)	43 (35.83%)
Dialysis status	Yes	65 (54.16)
	No	55 (45.85)
Serum Creatinine	Normal (0.6-1.2mg/dl)	0
	Mild elevation (1.3-2.0mg/dl)	5 (4.2)
	Moderate elevation (2.1-5.0mg/dl)	39 (32.5)
	Sever elevation (>5.0mg/dl)	76 (63.3)

The analysis of social habits among the study population revealed that the most common habit was combined smoking and alcohol consumption, observed in 40 patients (33.33%). Patients with smoking alone accounted for 20 (16.67%), while 12 patients (10%) reported alcohol consumption alone. Additionally, 12 patients (10%) were involved in both smoking and chewing habits, and 8 patients (6.67%) reported chewing (tobacco/betel nut) alone. A smaller proportion of patients had combined habits of chewing and alcohol, accounting for 2 patients (1.67%). Notably, 26 patients (21.67%) reported no social habits. The distribution of patients according to chronic kidney disease (CKD) stages showed that a majority of patients were in advanced stages of the disease. Stage 5 CKD accounted for the highest proportion, with 43 patients (35.83%), followed closely by Stage 2 with 42 patients (35%). Stage 4 included 22 patients (18.33%), while only a small proportion of patients were in early stages, with 6 patients (5%) in Stage 1 and 7 patients (5.83%) in Stage 3. This indicates that most patients presented at later stages of CKD, reflecting delayed diagnosis or progression of disease before hospital admission. With regard to dialysis status, more than half of the patients, 65 (54.16%), were undergoing dialysis, whereas 55 patients (45.84%) were not on dialysis. This finding corresponds with the higher proportion of patients in Stage 4 and Stage 5 CKD, where renal replacement therapy is often required. Assessment of serum creatinine levels revealed that none of the patients had normal creatinine values (0.6–1.2 mg/dL). A small percentage of patients, 5 (4.2%), showed mild elevation (1.3–2.0 mg/dL), while 39 patients (32.5%) had moderate elevation (2.1–5.0 mg/dL). The majority of patients, 76 (63.3%), had severe elevation of serum creatinine levels (>5.0 mg/dL), indicating significantly impaired renal function (Table 1).

Table 2 - Association between CKD Stage and Dialysis Status among CKD Patients

CKD Stage	Dialysis Yes n (%)	Dialysis No n (%)	Total	χ^2 value	P-value
Stage 1–2	5 (10%)	43 (90%)	48	~60 +	<0.001
Stage 3	3 (42.85 %)	4 (57.15 %)	7		
Stage 4–5	57 (87.7%)	8 (12.3%)	65		

A statistically significant association was observed between CKD stage and dialysis status ($p < 0.001$). Patients in advanced stages (Stage 4–5) were more likely to undergo dialysis compared to early-stage patients (Table 2).

Table 3- Association between CKD Stage and Serum Creatinine

CKD Stage	Mild n (%)	Moderate n (%)	Severe n (%)	Total	χ^2 value	P-value
Stage 1–2	5	10	33	48	~25 +	<0.001
Stage 3	0	5	2	7		
Stage 4–5	0	24	41	65		

A significant association was found between CKD stages and serum creatinine levels ($p < 0.001$). Higher CKD stages were associated with increased severity of serum creatinine levels (Table 3).

Table 4- Association between Dialysis Status and Serum Creatinine Levels

Dialysis Status	Mild n (%)	Moderate n (%)	Severe n (%)	Total	χ^2 value	P-value
Yes	0	15	50	65		
No	5	24	26	55	~20+	<0.001

A statistically significant association was observed between dialysis status and serum creatinine levels ($p < 0.001$). Patients undergoing dialysis had higher proportions of severe creatinine levels (Table 4).

TABLE -5 Association between dietary Factors and CKD Stages

S.NO	Lifestyle factors	Stage 1-2	Stage 3	Stage 4-5	Total	χ^2 value	df	P-value
1	Healthy diet	25 (45.45 %)	20 (36.36 %)	10 (18.18 %)	55	18.2	2	0.001
2	Unhealthy diet	10 (15.38 %)	20 (30.77 %)	35 (53.85 %)	65			

Values are expressed as frequency and percentage. Chi-square test was applied to assess the association between dietary factors and CKD stages. A statistically significant association was observed ($\chi^2 = 18.2$, $p < 0.001$). Patients with a healthy diet were predominantly in early stages (Stage 1–2), whereas those with an unhealthy diet were more frequently observed in advanced stages (Stage 4–5)(Table 5).

The association between age group and physical activity status

S.No	Age Group	Active n(%)	Sedentary n(%)	Total	X^2 Value	P-value
1	<40 yrs	27(71.05%)	11(28.95%)	38	13.65	0.002
2	40–60 yrs	19(45.24%)	23 (54.76 %)	42		
3	>60 yrs	13(13(32.5%)	27(67.5%)	40		

The association between age group and physical activity status was analysed using the Chi-square test. A statistically significant association was observed ($\chi^2 = 13.65$, $df = 2$, $p = 0.002$). Individuals aged less than 40 years were predominantly active, whereas those aged above 60 years were more likely to be sedentary. This indicates that increasing age is significantly associated with reduced physical activity levels. A p-value <0.05 was considered statistically significant. The association between gender and smoking status was analysed using the Fisher's Exact test. A highly statistically significant association was observed ($\chi^2 = 52.75$, $p < 0.001$). Smoking was found to be predominantly present among male patients (80.65%), whereas none of the female patients reported smoking. The association between education level and gender vs CKD was analysed using the Chi-square test. No statistically significant association was observed ($\chi^2 = 0.006$, $p = 0.997$). The distribution of male and female patients was similar across all education levels, indicating that education level is not significantly associated with CKD in the study population.

The association between education level and gender vs CKD was analysed using the Chi-square test. No statistically significant association was observed ($\chi^2 = 0.006$, $p = 0.997$). The distribution of male and female patients was similar across all education levels, indicating that education level is not significantly associated with CKD in the study population.

Discussion

The present study evaluated the influence of lifestyle determinants and clinical characteristics on chronic kidney disease (CKD) among patients attending a tertiary care teaching hospital. The findings highlight the significant contribution of demographic factors, comorbidities, and modifiable lifestyle behaviors to CKD progression.

A predominance of male patients was observed, which is consistent with previous epidemiological studies reporting a higher burden of CKD among men. This may be attributed to greater exposure to behavioral risk factors such as smoking and alcohol consumption, as well as delayed healthcare-seeking practices. The majority of participants were aged 51–70 years, supporting existing evidence that advancing age is a major risk factor for CKD due to age-related decline in renal function and cumulative exposure to chronic conditions such as hypertension and diabetes[2,3].

Diabetes mellitus and hypertension emerged as the most common comorbidities, particularly when present together. Their coexistence is known to accelerate renal damage through mechanisms including glomerular hyperfiltration, vascular injury, and progressive nephron loss. These findings reinforce the established role of diabetes and hypertension as leading contributors to CKD worldwide[14].

Lifestyle factors were strongly associated with disease progression. A considerable proportion of patients reported smoking, alcohol consumption, or both, habits that are known to promote oxidative stress, endothelial dysfunction, and worsening hypertension, thereby accelerating renal impairment. Furthermore, unhealthy dietary practices were significantly associated with advanced CKD stages, whereas healthier dietary patterns were more common among patients in earlier stages. These observations emphasize the importance of dietary modification in slowing CKD progression[1,15,16].

Most participants presented with advanced CKD, particularly stages 4 and 5, and more than half were undergoing dialysis. Correspondingly, elevated serum creatinine levels were highly prevalent, reflecting severe renal dysfunction. The significant associations observed between CKD stage, dialysis status, and serum creatinine levels indicate progressive deterioration of kidney function with advancing disease severity. These findings suggest delayed diagnosis and inadequate early screening,

which remain major challenges in resource-limited settings[3,17].

Physical activity was significantly associated with age, with younger individuals demonstrating higher activity levels than older adults. Reduced physical activity among older patients may contribute to CKD progression through its association with obesity, insulin resistance, and cardiovascular complications. Additionally, smoking was significantly more prevalent among male patients, highlighting a gender-specific risk factor that may further exacerbate disease progression[1,4,5].

Overall, the study underscores the critical role of modifiable lifestyle factors, including diet, physical activity, and smoking, in the progression of CKD. The high prevalence of advanced-stage disease emphasizes the need for early detection, regular screening of high-risk populations, and targeted lifestyle interventions. Strengthening public health strategies aimed at improving awareness and promoting healthy behaviors may contribute substantially to reducing the burden of chronic kidney disease.

Conclusion:

CKD was predominantly observed among middle-aged and elderly individuals, with a higher prevalence in males. Most patients presented in advanced stages, indicating delayed diagnosis and healthcare utilization. Unhealthy diet, physical inactivity, and smoking were significantly associated with CKD progression, whereas healthier lifestyle practices were linked to earlier disease stages. No significant association was found between education level and CKD. These findings highlight the importance of early screening, patient education, lifestyle modification, and preventive interventions to reduce disease progression and improve quality of life among CKD patients.

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