

Research Article

Prevalence and Risk Factors of Chronic Kidney Disease Among Adults With Hypertension and Diabetes Mellitus

R Venkatesh¹, Anitha Krishnan², P Suresh Kumar³, Lakshmi Priya Raman⁴

¹Professor and Head, ²Associate Professor, ³Senior Consultant Nephrologist, Department of Nephrology, Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai, Tamil Nadu, India

⁴Assistant Professor, Department of Community Medicine, JIPMER, Puducherry, India

DOI: <https://doi.org/10.24321/2349.7181.202604>

I N F O

Corresponding Author:

Lakshmi Priya Raman, Department of Community Medicine, JIPMER, Puducherry, India

E-mail Id:

ramanpriya05@gmail.com

Orcid Id:

<https://orcid.org/0009-0008-2641-3854>

How to cite this article:

Venkatesh R, Krishnan A, Kumar P S, Raman L P. Prevalence and Risk Factors of Chronic Kidney Disease Among Adults With Hypertension and Diabetes Mellitus. J Adv Res Med 2026; 13(2): 16-22.

Date of Submission: 2026-05-15

Date of Acceptance: 2026-06-16

A B S T R A C T

Background: Chronic kidney disease (CKD) has become a major public health concern worldwide, particularly among individuals with diabetes mellitus and hypertension. Early identification of CKD risk factors is essential for preventing disease progression and reducing renal morbidity.

Objective: To assess the prevalence and associated risk factors of chronic kidney disease among adults with hypertension and diabetes mellitus attending tertiary care hospitals in South India.

Methods: A hospital-based cross-sectional study was conducted among 240 adult patients diagnosed with hypertension and/or diabetes mellitus. Sociodemographic data, clinical history, laboratory investigations, estimated glomerular filtration rate (eGFR), and urine albumin levels were assessed. CKD staging was performed according to KDIGO guidelines.

Results: Among the participants, 38.3% were diagnosed with CKD. CKD prevalence was significantly higher among patients with uncontrolled diabetes, long-standing hypertension, obesity, and smoking history. Proteinuria and reduced eGFR were major predictors of renal impairment.

Conclusion: CKD prevalence remains considerably high among patients with hypertension and diabetes mellitus in South India. Early screening, lifestyle modification, glycemic control, blood pressure management, and regular renal monitoring are essential for prevention of CKD progression.

Keywords: Chronic kidney disease, Nephrology, Hypertension, Diabetes mellitus, Renal function, South India

Introduction

Chronic kidney disease is a problem for people all around the world. It is getting worse because more and more

people are getting it. It is very hard to treat. Chronic kidney disease is also closely linked to heart disease. When you have kidney disease your kidneys do not work properly.

Journal of Advanced Research in Medicine (P-ISSN: 2394-7047 & E-ISSN: 2349-7181)

Copyright (c) 2026: Author(s). Published by Advanced Research Publications



This happens because of damage to the kidneys that lasts for than three months.

At first chronic kidney disease does not cause any symptoms. Over time it can lead to very serious problems. If it gets bad enough you might need to have dialysis or a kidney transplant. The number of people with kidney disease has gone up a lot in the last twenty years. This is because more people have diabetes, high blood pressure and are overweight. People are also living longer. Not taking care of themselves.

Chronic kidney disease is a leading cause of death. It not affects your kidneys but it also increases your risk of heart disease, anemia and other health problems. In India more and more people are getting kidney disease. Between ten and seventeen percent of people in India have kidney disease. This is different in parts of the country depending on how much money people have how easy it is to get healthcare and what people eat.

In South India more people are getting kidney disease because of diabetes and high blood pressure. This is because people are moving to cities not exercising and eating food. Diabetes is a cause of chronic kidney disease. When you have diabetes your blood sugar is too high which damages your kidneys. High blood pressure is also bad, for your kidneys. It can cause scars. Make your kidneys work less well. Chronic kidney disease is a problem and we need to do something about it. Chronic kidney disease and diabetes and high blood pressure are all connected.

We need to take care of our kidneys. That means taking care of our whole body. We need to eat food, exercise and not smoke. If we do these things we can reduce our risk of getting kidney disease. Chronic kidney disease is a disease and it is closely linked to diabetes and high blood pressure. We need to be aware of the risks and take steps to prevent it. Chronic kidney disease is a problem and we need to take it seriously.

The coexistence of diabetes mellitus and hypertension further accelerates renal damage and substantially increases risk of CKD progression and cardiovascular complications.¹⁰ Patients with poorly controlled blood pressure and prolonged duration of diabetes are therefore particularly vulnerable to development of chronic renal impairment.

Chronic Kidney Disease or CKD is something that we should be concerned about. There are things that can increase the risk of getting CKD, including being overweight smoking not exercising, eating unhealthy foods having high cholesterol getting older and having a family history of kidney disease.

These things can all contribute to CKD development and progression.

Being overweight is especially bad for the kidneys. It can cause the body to become resistant to insulin. It can also lead to inflammation and oxidative stress, which can damage the kidneys. Smoking is also very bad for the kidneys. It can cause damage to the blood vessels in the kidneys, which can lead to kidney disease.

One of the problems with CKD is that it is often not diagnosed until it is too late. Many people do not have any symptoms until their kidneys are already badly damaged. Some people may feel tired. They may have to get up to use the bathroom at night or they may have swollen feet or high blood pressure.. These symptoms are not always easy to notice and many people do not go to the doctor until their kidneys are already very damaged.

This is why it is so important to try to prevent CKD from happening in the place. We can do this by getting check-ups and by managing any risk factors that we may have. For example we can get our blood sugar and blood pressure under control we can quit smoking we can eat foods and we can exercise more.

Doctors can also do some tests to check for CKD. They can check the level of creatinine in our blood. They can also check how well our kidneys are filtering waste. These tests can help doctors figure out if we have CKD and if so how bad it is.

There are also some treatments that are available for CKD. Some of these treatments can help to slow down the progression of the disease. They can also help to reduce the risk of complications. However these treatments are not always available to everyone in poorer countries.

In some places like India many people do not know enough about kidney disease. They may not know how to prevent it. They may not know how to get treated if they do get it. This is why it is so important to educate people about kidney disease and to make sure that they have access, to healthcare.

If we can do a job of preventing CKD and of treating it when it does happen we can help to reduce the number of people who get this disease. We can also help to reduce the number of people who die from it. CKD is a disease but it is also a preventable one. By taking care of our kidneys and by getting check-ups we can help to keep our kidneys healthy and we can reduce our risk of getting CKD.

Considering the increasing prevalence of diabetes mellitus and hypertension in South India, early evaluation of renal impairment among high-risk populations is critically

important. Identification of modifiable risk factors may assist clinicians and public health authorities in developing targeted preventive strategies for reducing progression of chronic kidney disease and associated complications.

The present study was therefore conducted to assess the prevalence and associated risk factors of chronic kidney disease among adults with hypertension and diabetes mellitus attending tertiary care hospitals in South India.

Materials and Methods

Study Design

Hospital-based cross-sectional study as shown in Figure 1.

Study Setting

The study was conducted at selected tertiary care hospitals in Chennai, Hyderabad, and Thiruvananthapuram between January 2025 and December 2025.

Study Population

Adult patients diagnosed with hypertension and/or diabetes mellitus attending nephrology and medicine outpatient departments were included.

Sample Size

A total of 240 participants were included in the study.

Inclusion Criteria

- Adults aged ≥ 30 years
- Diagnosed hypertension and/or diabetes mellitus
- Willingness to participate

Exclusion Criteria

- Acute kidney injury
- Pregnant women
- Known congenital renal disorders
- Critically ill patients

Data Collection

The following parameters were assessed:

- Sociodemographic characteristics
- Duration of hypertension and diabetes
- Smoking and alcohol history
- Body mass index (BMI)
- Blood pressure measurement
- Serum creatinine
- Estimated GFR
- Urine albumin-creatinine ratio

Statistical Analysis

Data were analyzed using SPSS version 26.0. Chi-square test and logistic regression analysis were applied. A p-value < 0.05 was considered statistically significant.

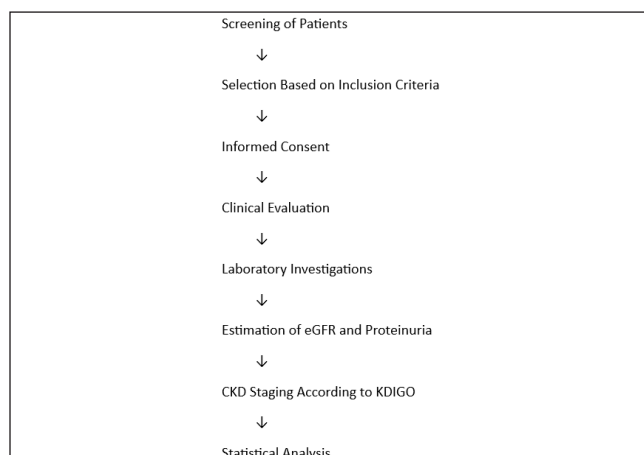


Figure 1. Flow Diagram of Study Methodology

Results

Table 1. Sociodemographic Characteristics of Participants

Variable	Frequency (n=240)	Percentage
Age 30–45 years	68	28.3%
Age 46–60 years	102	42.5%
Age >60 years	70	29.2%
Male	138	57.5%
Female	102	42.5%
Diabetes Mellitus	164	68.3%
Hypertension	186	77.5%
Smokers	72	30.0%
Obesity	88	36.7%

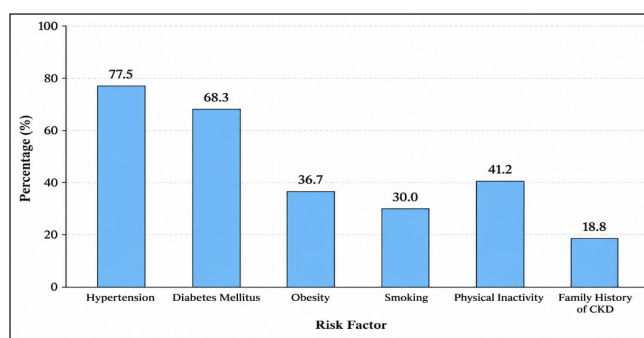


Figure 2. Prevalence of risk factors among study participants

Table 2. CKD Staging among Participants

CKD Stage	Frequency	Percentage
Stage 1	24	10.0%
Stage 2	38	15.8%
Stage 3	22	9.2%
Stage 4	6	2.5%

Stage 5	2	0.8%
No CKD	148	61.7%

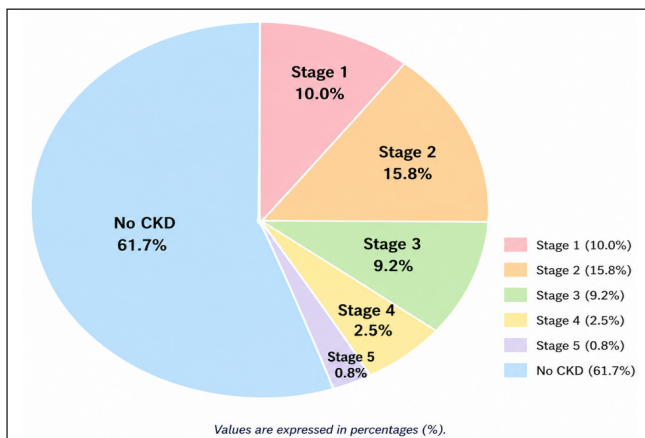


Figure 3. Distribution of chronic kidney disease stages

Table 3. Association between Risk Factors and CKD

Risk Factor	CKD Present (%)	p-value
Diabetes duration >10 years	58.4%	<0.001
Uncontrolled hypertension	54.2%	<0.001
Smoking	39.7%	0.012
Obesity	42.6%	0.008
Proteinuria	68.3%	<0.001

Discussion

The present study assessed the prevalence and associated risk factors of chronic kidney disease among adults with hypertension and diabetes mellitus attending tertiary care hospitals in South India. The findings demonstrated a considerably high prevalence of CKD among high-risk individuals, emphasizing the growing burden of renal disease in developing countries such as India. The increasing incidence of CKD represents a major healthcare challenge because of its association with cardiovascular complications, poor quality of life, increased hospitalization, and progression to end-stage renal disease requiring dialysis or renal transplantation.¹

Diabetes mellitus emerged as one of the most significant contributors to CKD in the present study. Similar observations have been reported in several national and international studies where diabetic nephropathy remains the leading cause of chronic kidney disease worldwide.^{8,9} Chronic hyperglycemia contributes to renal damage through multiple mechanisms including glomerular hyperfiltration,

activation of inflammatory pathways, oxidative stress, endothelial dysfunction, mesangial cell proliferation, and progressive renal fibrosis.¹⁰ Persistent elevation of blood glucose levels damages renal microvasculature and accelerates nephron loss, ultimately resulting in decline in glomerular filtration rate and albuminuria.

The prevalence of CKD was particularly higher among patients with long-standing diabetes mellitus. Duration of diabetes has consistently been identified as an important determinant of renal complications because prolonged exposure to hyperglycemia causes cumulative structural and functional damage to renal tissues.¹¹ Poor glycemic control also accelerates progression from microalbuminuria to overt nephropathy and advanced renal failure.

Hypertension was another major risk factor significantly associated with CKD in the present study. Elevated systemic blood pressure contributes to increased intraglomerular pressure, vascular sclerosis, ischemic injury, and progressive nephron destruction.¹² Hypertensive nephrosclerosis remains one of the most common causes of CKD globally, especially among older adults. Patients with uncontrolled hypertension demonstrated significantly greater prevalence of renal impairment, highlighting the importance of effective blood pressure management in nephrology practice.

The coexistence of hypertension and diabetes mellitus further increases susceptibility to CKD progression. Both conditions synergistically promote endothelial dysfunction, inflammation, oxidative stress, and vascular injury, thereby accelerating decline in renal function.¹³ Individuals with combined diabetes and hypertension therefore require aggressive risk factor modification and regular renal monitoring to prevent progression toward end-stage renal disease.

The present study additionally identified obesity as a significant predictor of chronic kidney disease. Obesity contributes to renal dysfunction through insulin resistance, systemic inflammation, adipokine imbalance, glomerular hyperfiltration, and activation of renin-angiotensin-aldosterone pathways.¹⁴ Obese individuals frequently develop metabolic syndrome, diabetes mellitus, and hypertension, all of which contribute to renal injury and accelerated CKD progression.

Smoking history was also significantly associated with CKD prevalence among study participants. Smoking promotes oxidative stress, endothelial dysfunction, chronic inflammation, renal vascular injury, and activation of sympathetic nervous system pathways.¹⁵ Tobacco exposure further aggravates hypertension and diabetic vascular complications, thereby increasing renal morbidity. Smoking cessation therefore remains an essential component of preventive nephrology and renal health promotion.

Proteinuria was identified as one of the strongest predictors of renal impairment in the present study. Persistent albuminuria reflects glomerular injury and increased permeability of the glomerular filtration barrier.¹⁶ Several previous studies have demonstrated strong association between proteinuria and CKD progression, cardiovascular morbidity, and mortality. Albuminuria also serves as an important prognostic marker for progression toward ESRD. Early detection and management of proteinuria through renin-angiotensin system blockade and glycemic control may therefore significantly delay renal deterioration.

The study findings also highlight the importance of estimated glomerular filtration rate (eGFR) in early CKD diagnosis and staging. Reduction in eGFR indicates progressive nephron loss and declining renal filtration capacity.² Regular monitoring of serum creatinine and eGFR among high-risk individuals enables early identification of renal dysfunction before development of severe complications.

One of the major concerns observed during the study was delayed presentation of patients for renal evaluation. Many individuals were diagnosed only after moderate decline in renal function had already occurred. Similar findings have been reported in previous Indian studies where lack of awareness, poor accessibility to healthcare services, inadequate screening programs, and socioeconomic limitations contributed to delayed CKD diagnosis.¹⁷

The asymptomatic nature of early CKD represents a major challenge in nephrology practice. Most patients remain clinically silent during initial stages and may present only when advanced renal impairment develops.¹⁸ Symptoms such as fatigue, edema, nocturia, anorexia, or hypertension often appear during later stages of disease progression. Consequently, community-based screening programs targeting diabetic and hypertensive populations are critically important for early detection and intervention.

The findings of the present study emphasize the growing importance of preventive nephrology approaches in reducing CKD burden. Early identification of at-risk individuals followed by lifestyle modification, blood pressure control, glycemic management, smoking cessation, weight reduction, and dietary counseling may substantially delay CKD progression.¹⁹ Patient education regarding renal health and adherence to medical therapy also plays an important role in improving long-term outcomes.

Dietary modification is an essential component of CKD management. Excessive dietary sodium contributes to hypertension and fluid retention, while high protein intake may accelerate glomerular hyperfiltration and renal damage in susceptible individuals.²⁰ Balanced nutrition with controlled sodium intake, adequate hydration, reduced processed food consumption, and weight management may therefore provide renoprotective benefits.

Recent therapeutic advances including sodium-glucose cotransporter-2 (SGLT2) inhibitors and renin-angiotensin-aldosterone system blockers have demonstrated significant renal protective effects among diabetic and hypertensive patients.²¹ These therapies reduce intraglomerular pressure, albuminuria, inflammation, and progression of CKD. Wider accessibility and affordability of such therapies may substantially improve renal outcomes in developing countries.

The study additionally highlights the close relationship between chronic kidney disease and cardiovascular disease. CKD patients are at markedly increased risk of hypertension, ischemic heart disease, heart failure, stroke, and sudden cardiac death.²² Endothelial dysfunction, chronic inflammation, oxidative stress, anemia, and vascular calcification contribute to elevated cardiovascular risk among CKD patients. Integrated cardiovascular and renal risk management is therefore essential for improving overall patient outcomes.

Public health measures focusing on early screening, awareness campaigns, lifestyle interventions, and strengthening primary healthcare infrastructure are essential for reducing CKD burden in India. Integration of renal screening into diabetes and hypertension clinics may facilitate early identification of renal dysfunction among high-risk individuals.

Despite important findings, the present study has certain limitations. Being a hospital-based cross-sectional study, causal relationships could not be established. The sample size was relatively limited and findings may not fully represent the general population. Longitudinal multicentric studies involving larger populations are therefore required to better understand CKD epidemiology and progression patterns in South India.

Overall, the present study reinforces the growing burden of chronic kidney disease among adults with hypertension and diabetes mellitus and highlights the urgent need for preventive nephrology strategies aimed at early diagnosis, risk factor modification, and reduction of renal morbidity and mortality.

Conclusion

Chronic kidney disease has emerged as a major public health concern worldwide and continues to impose substantial clinical, economic, and social burden, particularly in developing countries such as India. The present study demonstrated a high prevalence of CKD among adults with hypertension and diabetes mellitus attending tertiary care hospitals in South India. The findings highlight the growing importance of preventive nephrology and early identification of renal impairment among high-risk populations.

Diabetes mellitus and hypertension were identified as the most significant contributors to chronic kidney disease in the present study. Long duration of diabetes, uncontrolled blood pressure, obesity, smoking, and persistent proteinuria were strongly associated with renal dysfunction and CKD progression. These findings reinforce the multifactorial nature of chronic kidney disease and emphasize the close interrelationship between metabolic disorders, cardiovascular risk factors, and renal injury.

The study also demonstrated that many patients remain asymptomatic during early stages of CKD and are frequently diagnosed only after substantial decline in renal function has already occurred. Delayed diagnosis contributes significantly to increased risk of cardiovascular complications, hospitalization, dialysis dependency, and premature mortality. Early detection through routine renal function screening among diabetic and hypertensive individuals is therefore critically important.

Assessment of serum creatinine, estimated glomerular filtration rate (eGFR), and urine albumin excretion should be integrated into regular clinical evaluation of high-risk patients. Early identification of microalbuminuria and declining renal function may allow timely intervention and implementation of renoprotective measures before irreversible nephron damage develops.

Lifestyle modification remains a cornerstone in prevention and management of chronic kidney disease. Weight reduction, regular physical activity, smoking cessation, dietary salt restriction, glycemic control, and optimal blood pressure management may significantly delay CKD progression and improve long-term renal outcomes. Patient education regarding adherence to medication, hydration, dietary regulation, and regular follow-up is equally important for preventing renal deterioration.

The study further highlights the growing need for community awareness programs focused on kidney disease prevention. Public knowledge regarding CKD risk factors and early symptoms remains inadequate in many regions of India, leading to delayed healthcare utilization and poor treatment outcomes. Community-based screening camps, health education initiatives, and integration of renal health services into primary healthcare systems may therefore improve early diagnosis and reduce disease burden.

Recent advances in nephrology including renin-angiotensin-aldosterone system inhibitors, sodium-glucose cotransporter-2 (SGLT2) inhibitors, and improved antihypertensive strategies have demonstrated significant benefits in slowing CKD progression and reducing cardiovascular risk. Wider accessibility and affordability of these therapies may substantially improve renal healthcare outcomes in resource-limited settings.

The close association between chronic kidney disease and cardiovascular disease also emphasizes the need for multidisciplinary and integrated healthcare approaches. CKD patients frequently experience increased risk of ischemic heart disease, heart failure, stroke, anemia, and metabolic complications. Collaborative management involving nephrologists, physicians, endocrinologists, cardiologists, dieticians, and public health professionals is therefore essential for comprehensive patient care.

Strengthening preventive nephrology infrastructure, improving healthcare accessibility, expanding screening programs, and promoting healthy lifestyle practices may substantially reduce the growing burden of chronic kidney disease in India. Policymakers and healthcare institutions should prioritize renal disease prevention strategies through national health initiatives and community outreach programs.

Although the present study provides important insights into CKD prevalence and associated risk factors among high-risk individuals in South India, further large-scale multicentric longitudinal studies are required to better understand disease progression, regional epidemiology, and effectiveness of preventive interventions.

Overall, the findings of the present study emphasize that early diagnosis, regular renal monitoring, lifestyle modification, patient education, and effective management of diabetes mellitus and hypertension remain essential for reducing chronic kidney disease progression, improving quality of life, and minimizing long-term renal and cardiovascular complications.

Conflict of Interest: None

Source of Funding: None

References

1. Kidney Disease Improving Global Outcomes (KDIGO). Clinical practice guideline for evaluation and management of chronic kidney disease. *Kidney Int Suppl.* 2013;3(1):1-150.
2. Jha V, Garcia-Garcia G, Iseki K, Li Z, Naicker S, Plattner B, et al. Chronic kidney disease: global dimension and perspectives. *Lancet.* 2013;382(9888):260-272.
3. Bikbov B, Purcell CA, Levey AS, Smith M, Abdoli A, Abebe M, et al. Global, regional, and national burden of chronic kidney disease. *Lancet.* 2020;395(10225):709-733.
4. Varma PP. Prevalence of chronic kidney disease in India. *Indian J Nephrol.* 2015;25(3):133-134.
5. Alicic RZ, Rooney MT, Tuttle KR. Diabetic kidney disease: challenges and opportunities. *Clin J Am Soc Nephrol.* 2017;12(12):2032-2045.
6. Levin A, Stevens PE. Summary of KDIGO guideline. *Kidney Int.* 2014;85(1):49-61.

7. Levey AS, Coresh J. Chronic kidney disease. *Lancet*. 2012;379(9811):165-180.
8. Chen TK, Knicely DH, Grams ME. Chronic kidney disease diagnosis and management. *JAMA*. 2019;322(13):1294-1304.
9. Singh AK, Farag YM, Mittal BV, Subramanian KK, Reddy SR, Acharya VN, et al. Epidemiology and risk factors of CKD in India. *BMC Nephrol*. 2013;14:114.
10. Tuttle KR, Bakris GL, Bilous RW, Chiang JL, de Boer IH, Goldstein-Fuchs J, et al. Diabetic kidney disease. *Diabetes Care*. 2014;37(10):2864-2883.
11. Kovesdy CP, Furth SL, Zoccali C. Obesity and kidney disease. *Kidney Int*. 2017;91(3):535-547.
12. Lambers Heerspink HJ, Gansevoort RT. Albuminuria and CKD progression. *Clin J Am Soc Nephrol*. 2015;10(11):1936-1945.