

FREQUENCY OF MODIFIABLE RISK FACTORS FOR CHRONIC KIDNEY DISEASE IN A TERTIARY CARE HOSPITAL OF KHYBER PAKHTUNKHWA

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Abstract**OBJECTIVE:** To determine the frequency of modifiable risk factors for chronic kidney disease in a tertiary care hospital of Khyber Pakhtunkhwa.**Materials and Methods:** This cross-sectional study was carried out in the Department of Nephrology at Lady Reading Hospital, Peshawar, between January and June 2025. Patients were enrolled consecutively over six months using a non-probability sampling method. A total of 104 participants were included, with the sample size determined through OpenEpi using a 5% margin of error. Adult patients (≥ 18 years), of either gender, with CKD at any stage were eligible for inclusion.**Results:** The study enrolled 104 CKD patients, including 51 males (48.1%) and 53 females (51.9%), with a mean age of 50.9 ± 14.9 years and a median eGFR of 23 ml/min/1.73 m², indicating advanced disease. Long-standing hypertension was observed in 80 patients (76.9%) and diabetes mellitus in 75 (72.1%). Other risk factors included dyslipidemia in 48 (46.2%), prolonged herbal medication use in 44 (42.3%), smoking in 34 (32.7%), chronic obstructive uropathy in 25 (24.0%), and recurrent renal stones in 22 (21.2%).**Conclusion:** This study demonstrates a high burden of modifiable risk factors, especially diabetes, hypertension, and herbal medication use, among CKD patients, emphasizing the importance of early detection, targeted interventions, and public health strategies to prevent disease progression.**INTRODUCTION**

Chronic kidney disease (CKD) is a significant universal population health issue, which is defined by progressive deterioration of the kidney structure or functioning and is accompanied by cardiovascular morbidity, mortality and health care costs.^{1,2} The global incidence of CKD has been on the rise in the past decades, which is mostly caused by the growing age of the population and the increasing non-communicable

disease burden, specifically diabetes mellitus and hypertension.³ Nowadays, CKD can be considered a separate risk factor of poor health outcomes and quality of life, particularly in resource-constrained conditions.^{4,5}

The pathogenesis of CKD is complicated and is geographically diverse. Diabetes mellitus and hypertension continue to dominate the world as they cause the largest percentage of CKD cases.⁶

Nevertheless, there are a few other factors that can be changed and probably lead to CKD development and progression such as obstructive uropathy, frequent renal stone disease, and long-term exposure to nephrotoxic substances.⁷ These factors are frequently comorbid and underdiagnosed in the low- and middle-income countries until disease progression is advanced.⁸ Traditional and herbal use of medicine is a significant aspect of CKD that is largely ignored in developing countries.⁹ Due to the absence of regulation, low awareness on nephrotoxicity and the widespread cultural perception, people have been exposed to potentially harmful substances and have caused the avoidable kidney damage.¹⁰ On the same note, obstructive uropathy and nephrolithiasis may cause irreversible renal damage when diagnosis and management are delayed unless timely measures are taken.⁷ The early detection and intervention of these risk factors are very important in slowing down the disease progression and decreasing the complications.¹¹ Nevertheless, a significant number of patients in Pakistan have advanced CKD on presenting to tertiary care facilities, which indicates the lack of screening programs, low health literacy, and deficient access to primary healthcare services.^{8,12} It is therefore important to understand local burden of modifiable risk factors in order to implement specific prevention programs, and enhance patient outcomes. In Khyber Pakhtunkhwa, CKD is an issue with an increasing burden on the healthcare system, but, at the same time, there is limited information on preventable risk factors in the region. The differences in socioeconomic status, health-seeking behavior and environmental exposures also highlight the need of local evidence production. The current research was conducted to evaluate the prevalence of the modifiable risk factors of CKD among adult patients in a tertiary care hospital in Khyber Pakhtunkhwa. It was hypothesized that a substantial proportion of patients would exhibit one or more identifiable and potentially preventable risk factors contributing to CKD.

Materials and Methods

The study is cross-sectional and was undertaken in the Department of Nephrology, MTI Lady Reading Hospital, Peshawar in January 2025 to June 2025. The study was conducted after receiving ethical approval of the study by the Institutional Ethical and Review Board of Lady Reading Hospital under the reference number 274.1/LRH/MTI.

Patient recruitment was done using a non-probability consecutive sampling method. Based on the assumption of a predicted frequency of modifiable risk factors among CKD patients and assuming the use of a confidence level of 95 percent with a 5 percent margin of error, a sample of 104 patients was estimated through the OpenEpi sample size calculator. The sample was enrolled in a sequential manner using adult patients of either sex aged 18 years and above, diagnosed with chronic kidney disease of any stage, and waiting in the Nephrology outpatient section or hospitalized in the ward. The patients who had acute kidney injury, had renal transplantation and patients who had been on maintenance hemodialysis were not included in the study. Structured proforma was used to collect demographic and clinical data after receiving a written informed consent. Age, gender, residential status (urban or rural), body mass index (BMI), history, and duration of diabetes mellitus, hypertension status, use of traditional or herbal medication more than six months, long-term obstructive uropathy history, and frequent renal stone disease history information were noted. As per the KDIGO guidelines, chronic kidney disease was considered the manifestation of kidney damage or decreasing estimated glomerular filtration rate (eGFR) to below 60 mL/min/1.73 m². The eGFR was determined by MDRD equation.

All the acquired data were entered and processed in SPSS version 26. The quantitative variables that are age, BMI, and eGFR were presented in the form of mean + standard deviation and median, respectively. Categorical variables, such as gender, residence, diabetes mellitus, hypertension, herbal medication use, obstructive uropathy, and regular

renal stones were summarized using frequencies and percentages.

Results:

A total of 104 patients with chronic kidney disease (CKD) were included in the study. The baseline demographic and clinical characteristics are summarized in Table (1). The study population comprised 53(51.0%) females and 51 (49.0%) males, with a mean age of 50.9 ± 14.9 years. More than half of the participants belonged to rural

areas (55.3%). The mean body mass index (BMI) was 27.1 ± 3.4 kg/m². Renal function assessment revealed a mean estimated glomerular filtration rate (eGFR) of 26.6 ± 15.6 ml/min/1.73 m², with a median eGFR of 23 ml/min/1.73 m², indicating advanced CKD in a large proportion of patients. In terms of CKD severity, CKD stage 4 was the most frequent stage, observed in 43 patients (41.3%), followed by stage 3b in 32 (30.8%), stage 5 in 17 (16.3%), and stage 3a in 12 patients (11.5%).

Table (1): Baseline demographic characteristics

Variables	Frequency(n)	Percentage (%)
Age in years		
<30 years	11	(10.6%)
30–60 years	56	(53.8%)
> 60 years	37	(35.6%)
Gender		
Male	50	(48.1%)
Female	54	(51.9%)
Residence		
Rural	58	(55.8%)
Urban	46	(44.2%)
Body Mass Index (BMI)		
< 25 kg/m ²	30	(28.8%)
25–30 kg/m ²	50	(48.1%)
> 30 kg/m ²	24	(23.1%)
CKD Stage		
CKD Stage 3a	12	(11.5%)
CKD Stage 3a	32	(30.8%)
CKD Stage 4	43	(41.3%)
CKD Stage 5 (ND)	17	(16.3%)

Among modifiable risk factors, hypertension was the most prevalent, affecting 80 (76.9%) patients, followed by diabetes mellitus in 75 (72.1%). Chronic NSAID use for more than three months was commonly reported, along with prolonged use

of traditional (herbal) medications. Dyslipidemia and smoking were frequently observed. Chronic obstructive uropathy and recurrent renal stones were identified in a smaller subset of patients. These findings are summarized in Fig. (1)

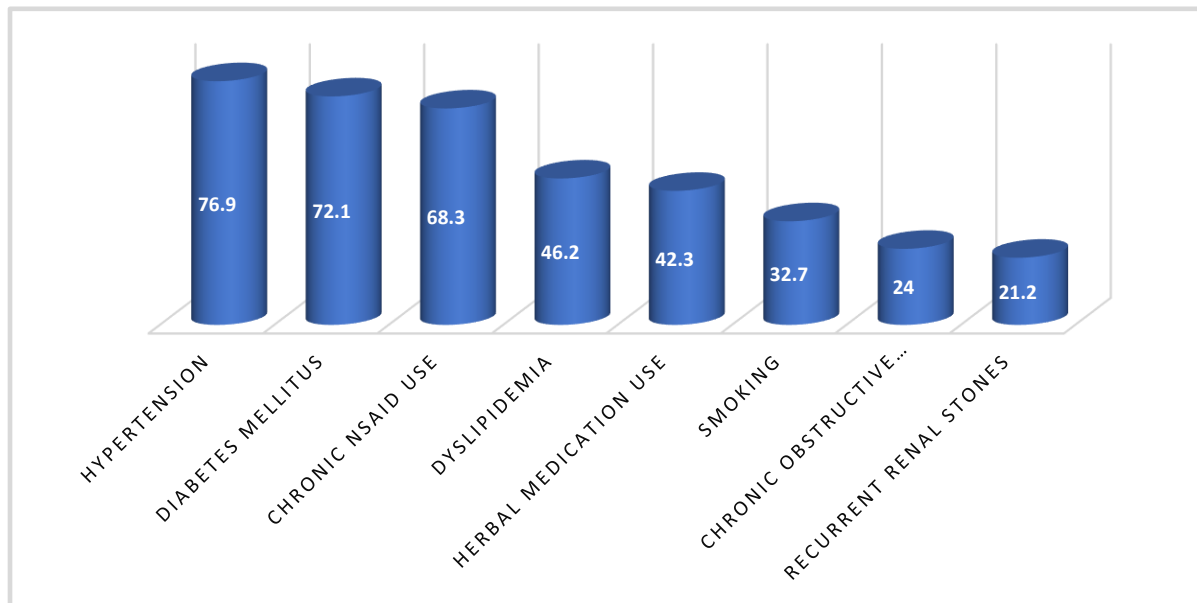


Fig (1): Frequency of Modifiable risk factors for CKD Patients (n=104)

On gender-based stratification, the use of traditional (herbal) medications was significantly more common among males compared to females ($p < 0.001$). Smoking showed a highly significant association with male gender, as all smokers were males ($p < 0.001$). Additionally, recurrent renal

stones were significantly more frequent in males than females ($p = 0.009$). No statistically significant gender-based differences were observed for diabetes mellitus, hypertension, chronic NSAID use, chronic obstructive uropathy, or dyslipidemia ($p > 0.05$). summarized in Table (2).

Table (2): Gender Stratification of Modifiable Risk Factors among CKD Patients.

Risk Factor	Male n (%)	Female n (%)	P value
Hypertension	38 (76.0)	42 (77.8)	0.830
Diabetes mellitus	39 (78.0)	36 (66.7)	0.198
Chronic NSAID use	33 (66.0)	38 (70.4)	0.632
Herbal medication use	32 (64.0)	12 (22.2)	<0.001
Dyslipidemia	21 (42.0)	27 (50.0)	0.414
Smoking	34 (68.0)	0 (0.0)	<0.001
Chronic obstructive uropathy	10 (20.0)	15 (27.8)	0.354
Recurrent renal stones	16 (29.6)	6 (12.0)	0.009

Age-wise stratification did not demonstrate a statistically significant association between age groups and most modifiable risk factors, including diabetes mellitus, hypertension, chronic NSAID use, smoking, recurrent renal stones, dyslipidemia,

and herbal medication use ($p > 0.05$). Although chronic obstructive uropathy showed a trend toward significance across age groups, this association did not reach statistical significance ($p = 0.060$). summarized in Table (2).

Table (3): Age-wise Stratification of Modifiable Risk Factors among CKD Patients

Risk Factor	<30 years n (%)	30–60 years n (%)	>60 years n (%)	P value
Hypertension	6 (54.5)	44 (78.6)	30 (81.1)	0.170
Diabetes mellitus	5 (45.5)	44 (78.6)	26 (70.3)	0.078
Chronic NSAID use	7 (63.6)	40 (71.4)	24 (64.9)	0.754
Herbal medication use	6 (54.5)	24 (42.9)	14 (37.8)	0.611
Dyslipidemia	5 (45.5)	26 (46.4)	17 (45.9)	0.998
Smoking	4 (36.4)	17 (30.4)	13 (35.1)	0.858
Chr obst uropathy	3 (27.3)	18 (32.1)	4 (10.8)	0.060
Recurrent renal stones	2 (18.2)	13 (23.2)	7 (18.9)	0.856

Discussion:

The current study provides an emphasis on the presence of a significant mortality of modifiable risk factors in chronic kidney disease (CKD) patients who present to a tertiary care hospital in Khyber Pakhtunkhwa. The fact that hypertension (76.9%) and diabetes mellitus (72.1%) were the most prevalent in this group adds more evidence to the previous findings that the two are major causes of CKD worldwide and in low- and middle-income countries.¹³⁻¹⁵ The results are in line with massive epidemiological studies that point to diabetes and hypertension as the leading causes of CKD progression, especially in areas where early screening and preventive services are not easily available.^{14,16}

One of the interesting results of this study is that chronic use of NSAIDs (68.3%) and traditional herbal medication use (42.3%) was quite high. Extended exposure to nephrotoxic agents is a known but under-reported causal factor of CKD in third world countries.¹⁷ The high rates of male dominance in the use of herbal medication and smoking as observed in gender-based stratification highlights the role of the social cultural practices and health seeking behavior in exposure to renal risk. Gender differences have also been reported to be similar with regional and international studies with males more prone to use unregulated traditional remedies and tobacco products.¹⁸ This is an important finding that must focus on specific public health education on potentially preventable nephrotoxic exposures.

The prevalence of recurrent renal stones in males compared to females in this study had a statistically significant relationship ($p = 0.009$), which is consistent with the findings of earlier studies where males were reported to have a higher prevalence of nephrolithiasis.¹⁹ This may be attributed to greater exposure among males to stone-forming risk factors such as dietary habits, occupational dehydration, higher metabolic risk profiles, and lifestyle factors. The age-based stratification failed to provide statistically significant associations with most of the risk factors, except that there was a trend of significance with chronic obstructive uropathy ($p = 0.060$). This would indicate that structural abnormalities of the urinary tract can build up over age but be asymptomatic until disease.

Most of the patients included in this study reported with advanced CKD (3b-5) with a low median eGFR of 23 ml/min/1.73 m². This non-timely presentation reflects trends in South Asia and the sub-Saharan region and reflects a lack of early detection and referral pathways and screening programs among communities.^{15,18,20} The originality of this research is the thorough consideration of various modifiable risk factors in one cohort of the region, which offers evidence-related to the local region to preventive measures.

Conclusion

This study has indicated a high prevalence of preventable and modifiable risk factors in CKD patients in Khyber Pakhtunkhwa. The early

detection and active treatment of diabetes, hypertension, and nephrotoxic exposures, especially NSAIDs and herbal drugs, are the keys to decreasing the CKD burden and postponing the development of the disease. Increasing the strength of the primary healthcare screening and community education might lead to a significant improvement in renal outcomes among this group.

Recommendation

Early screening and timely referral of high-risk individuals with diabetes and hypertension should be prioritized to reduce late presentation of CKD. Public awareness regarding the nephrotoxic effects of prolonged NSAID and herbal medication use must be strengthened, alongside strict regulation and promotion of safer therapeutic alternatives.

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Study approval statement

This study was approved by the Institutional Ethical and Review Board of MTI Lady Reading Hospital, Peshawar (Reference No. 274.1/LRH/MTI).

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