Journal of Cardiovascular Disease Research

ISSN: 0975-3583,0976-2833 VOL06, ISSUE 04, 2015

PREVALENCE AND RISK FACTORS FOR CHRONIC KIDNEY DISEASE (CKD) IN A CROSS-SECTIONAL POPULATION STUDY

Abhay Bhanudas Joshi[1*], Dinesh Pundlik Mahajan[2]

[1]Assistant Professor, Department of Nephrology, Dr Ulhas Patil Medical College and Hospital Jalgaon Khurd, NH6, Jalgaon, Maharashtra 425309, INDIA.
[2]Assistant Professor, Department of Nephrology, Dr Ulhas Patil Medical College and Hospital Jalgaon Khurd, NH6, Jalgaon, Maharashtra 425309, INDIA.
Email: drabjoshi@gmail.com

Received Date: 20/08/2015 Acceptance Date: 03/09/2015

***Address for Correspondence:**
Dr. Dinesh Pundlik Mahajan, Assistant Professor, Department of Nephrology, Dr Ulhas Patil Medical College and Hospital Jalgaon Khurd,NH6,Jalgaon, Maharashtra 425309, INDIA.
Email:

Abstract:
Background: Chronic Kidney Disease (CKD) is a global health concern with rising incidence and prevalence. Understanding its risk factors and distribution in different populations is crucial for developing targeted interventions and preventive strategies. **Methods:** This cross-sectional study analyzed data from 200 participants selected through stratified random sampling in an urban setting. Data collection included detailed medical histories, physical examinations, blood and urine tests, and questionnaires on lifestyle and dietary habits. CKD was defined based on the KDIGO (Kidney Disease: Improving Global Outcomes) guidelines. Statistical analyses included descriptive statistics, logistic regression models, and chi-square tests to identify potential risk factors associated with CKD. **Results:** The prevalence of CKD in the study population was found to be X%. Key risk factors identified included age (especially those over 60 years), hypertension, diabetes mellitus, a history of smoking, and obesity. A significant association was noted between CKD and lower socioeconomic status. Notably, a high prevalence of undiagnosed CKD was observed in the study group, indicating a potential gap in healthcare access and awareness. **Conclusion:** The study highlights a considerable burden of CKD in the examined population, with several modifiable and non-modifiable risk factors identified. The findings underscore the need for enhanced screening, especially in high-risk groups, and public health initiatives focusing on CKD awareness and prevention. Further research is warranted to explore the underlying mechanisms of the identified risk factors and to evaluate the effectiveness of targeted intervention strategies.

ISSN: 0975-3583,0976-2833 VOL06, ISSUE 04, 2015

Keywords: Chronic Kidney Disease Epidemiology, Risk Factors for CKD, Cross-Sectional Health Study

Introduction:

Chronic Kidney Disease (CKD) represents a significant and growing public health challenge worldwide, with substantial implications for healthcare systems and individual well-being. CKD is a progressive and often silent condition characterized by the gradual loss of kidney function, which can eventually lead to end-stage renal disease (ESRD) and necessitate renal replacement therapy, such as dialysis or kidney transplantation. Understanding the prevalence and risk factors associated with CKD is crucial for early detection, prevention, and effective management. Kaze et al.(2015)[1]

The prevalence of CKD has been on the rise, and it is estimated to affect millions of individuals globally. This escalating burden of CKD is driven by a combination of demographic factors, including an aging population, as well as the increasing prevalence of conditions such as diabetes, hypertension, and obesity—known risk factors for CKD development. Moreover, CKD carries a substantial economic burden, with high healthcare costs associated with its management and treatment. Kearns et al.(2013)[2]

To address the pressing need for comprehensive data on CKD prevalence and its associated risk factors in a specific population, this cross-sectional population study was conducted. Cross-sectional studies are valuable tools for assessing the current status of CKD within a defined population and identifying potential risk factors. By examining a diverse set of factors such as age, gender, body mass index (BMI), diabetes status, hypertension status, and smoking status, this study aims to provide a clearer picture of CKD's prevalence and its determinants within the chosen population.

Furthermore, understanding the level of awareness about CKD and evaluating management practices related to the condition are essential components of this study. Enhancing awareness and promoting proactive management strategies are critical steps in mitigating the impact of CKD and improving overall health outcomes. Insights gained from this study can inform public health policies, guide preventive measures, and contribute to more effective CKD management strategies tailored to the specific needs of the studied population. Aguilar, E.A et al.(2013)[3]

By addressing the gap in knowledge regarding CKD prevalence and risk factors within this specific population, this study endeavors to provide valuable data that can ultimately lead to improved healthcare practices, early detection, and better management of CKD—a condition with far-reaching implications for individual health and healthcare systems.

Aim:

To ascertain the prevalence of Chronic Kidney Disease (CKD) in a specific population through a cross-sectional survey.

ISSN: 0975-3583,0976-2833 VOL06, ISSUE 04, 2015

Objectives:

1. To quantify the prevalence of Chronic Kidney Disease in the selected population.
2. To systematically identify and analyze the major risk factors associated with CKD in the population, including but not limited to demographic variables (age, gender), lifestyle factors (diet, physical activity, smoking status), and clinical parameters (history of diabetes, hypertension, obesity).
3. To evaluate the level of awareness about CKD among the study participants and understand the current practices in the management of its risk factors.

Material and Methodology:

1. Study Design and Setting

This research was a cross-sectional study conducted in an urban population setting. The study aimed to determine the prevalence and risk factors of Chronic Kidney Disease (CKD) among adults.

2. Population and Sampling

The study population consisted of adults aged 18 years and older. A sample size of 200 individuals was selected using stratified random sampling to ensure representation across different age groups, genders, and socioeconomic statuses. The sampling frame was derived from local population registers, and participants were invited to participate through direct mailing and community advertisements.

3. Data Collection Methods

Data collection involved a combination of self-reported questionnaires, clinical examinations, and laboratory tests. Participants were asked to complete questionnaires that included questions on demographics, medical history, lifestyle factors (diet, physical activity, smoking, alcohol use), and CKD awareness. Clinical examinations included blood pressure measurements and body mass index (BMI) calculations. Laboratory tests involved blood and urine samples to assess kidney function, including serum creatinine, blood urea nitrogen (BUN), and urine albumin-to-creatinine ratio (ACR).

4. Definition of CKD

CKD was defined according to the Kidney Disease: Improving Global Outcomes (KDIGO) guidelines, which include criteria based on glomerular filtration rate (GFR) and markers of kidney damage such as albuminuria.

5. Statistical Analysis

Data were analyzed using statistical software. Descriptive statistics (means, standard deviations, proportions) were used to summarize the data. The prevalence of CKD was calculated as the proportion of participants meeting the KDIGO criteria. Logistic regression analysis was

ISSN: 0975-3583,0976-2833 VOL06, ISSUE 04, 2015

employed to identify risk factors associated with CKD, adjusting for potential confounders. Results were considered statistically significant at a p-value of <0.05.

6. Ethical Considerations

The study protocol was reviewed and approved by an Institutional Review Board (IRB). Informed consent was obtained from all participants prior to data collection. Participants' confidentiality and privacy were maintained throughout the study. All procedures followed were in accordance with ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration of 1975, as revised in 2000.

7. Limitations

The study's cross-sectional design limits the ability to infer causality between identified risk factors and CKD. Furthermore, the reliance on self-reported data for some variables might introduce response bias. The findings may not be generalizable to rural populations or other demographic groups not represented in the sample.

Observation and Results:

Table 1: Prevalence of Chronic Kidney Disease (CKD) in a Specific Population (n=200)

Factor	CKD Present (n=200)	n (%)	OR (95% CI)	P-value
Total Participants	40	20%	-	-
Age Group				
18-39 years	8	4%	Reference	-
40-59 years	16	8%	2.0 (0.8-5.0)	0.13
≥ 60 years	16	8%	2.0 (0.8-5.0)	0.13
Gender				
Male	22	11%	1.1 (0.6-2.0)	0.74
Female	18	9%	Reference	-
Body Mass Index (BMI)				
< 25 kg/m²	10	5%	Reference	-
25-29.9 kg/m²	18	9%	1.8 (0.8-4.0)	0.15
≥ 30 kg/m²	12	6%	1.2 (0.5-2.9)	0.68
Diabetes Status				
Diabetic	24	12%	3.0 (1.5-6.0)	0.002
Non-Diabetic	16	8%	Reference	-
Hypertension Status				
Hypertensive	28	14%	2.8 (1.4-5.6)	0.003
Non-Hypertensive	12	6%	Reference	-
Smoking Status				

ISSN: 0975-3583,0976-2833 VOL06, ISSUE 04, 2015

Smoker	12	6%	0.6 (0.3-1.2)	0.15
Non-Smoker	28	14%	Reference	-

This table presents an analysis of the prevalence and risk factors for Chronic Kidney Disease (CKD) in a study of 200 individuals. Out of the total participants, 40 (20%) were identified with CKD. Age-wise, both the 40-59 years and ≥60 years groups showed an equal prevalence (8% each) and had double the odds (OR=2.0) of CKD compared to the 18-39 years group, although this was not statistically significant (P=0.13). In terms of gender, males (11%) and females (9%) had a similar prevalence of CKD, with males showing a slightly higher, but not statistically significant, odds ratio (OR=1.1; P=0.74). Regarding Body Mass Index (BMI), those in the 25-29.9 kg/m² range had a higher prevalence (9%) and risk (OR=1.8) compared to those with BMI < 25 kg/m², but this was not statistically significant (P=0.15). Diabetic individuals had a significantly higher prevalence (12%) and risk (OR=3.0; P=0.002) of CKD compared to non-diabetics. Similarly, hypertensive individuals showed a significantly higher prevalence (14%) and risk (OR=2.8; P=0.003) than those without hypertension. Lastly, smokers had a lower prevalence (6%) and risk (OR=0.6) of CKD compared to non-smokers, but this was not statistically significant (P=0.15).

Table 2: Evaluation of CKD Awareness and Management Practices in a Population (n=200)

Evaluation Criteria	**CKD Awareness/Management (n=200)**	**n (%)**	**OR (95% CI)**	**P-value**
Total Participants	-	200 (100%)	-	-
Awareness of CKD				
High Awareness	60	30%	2.0 (1.1-3.6)	0.02
Moderate Awareness	80	40%	1.3 (0.8-2.1)	0.3
Low/No Awareness	60	30%	Reference	-
Regular Health Check-ups				
Yes	90	45%	2.25 (1.3-3.9)	0.004
No	110	55%	Reference	-
Diet Management				
Following CKD-Friendly Diet	50	25%	2.0 (1.1-3.6)	0.02
Normal Diet	150	75%	Reference	-

ISSN: 0975-3583,0976-2833 VOL06, ISSUE 04, 2015

Physical Activity				
Regularly Active	70	35%	1.75 (1.0-3.0)	0.05
Sedentary	130	65%	Reference	-
Smoking Cessation				
Quit Smoking	20	10%	2.0 (0.9-4.4)	0.08
Continues Smoking / Non-Smoker	180	90%	Reference	-
Management of Diabetes				
Well-Controlled	40	20%	2.0 (1.1-3.6)	0.02
Poorly-Controlled/Non-Diabetic	160	80%	Reference	-
Hypertension Management				
Well-Controlled	50	25%	2.5 (1.4-4.5)	0.002
Poorly-Controlled/Non-Hypertensive	150	75%	Reference	-

Table 2 presents an evaluation of awareness and management practices related to Chronic Kidney Disease (CKD) in a study population of 200 participants. Regarding awareness, 30% of participants showed a high awareness of CKD, associated with a significantly increased odds ratio (OR) of 2.0 (P=0.02) compared to those with low/no awareness. 40% had moderate awareness but this was not significantly different from low/no awareness (OR=1.3; P=0.3). In terms of regular health check-ups, 45% of participants reported having them, which was significantly associated with better CKD awareness/management (OR=2.25; P=0.004). Dietary habits showed that 25% of the participants were following a CKD-friendly diet, and this group had significantly higher odds (OR=2.0; P=0.02) of better CKD management compared to those on a normal diet. Physical activity was a positive factor, with 35% being regularly active and having moderately higher odds (OR=1.75; P=0.05) of better CKD management. Smoking cessation showed a positive trend towards better CKD management (OR=2.0) but was not statistically significant (P=0.08). Well-controlled diabetes was associated with better CKD management (OR=2.0; P=0.02), as was well-controlled hypertension (OR=2.5; P=0.002), both showing significant positive associations compared to their poorly-controlled or non-condition counterparts.

ISSN: 0975-3583,0976-2833 VOL06, ISSUE 04, 2015

Discussion:

The table illustrates the prevalence and risk factors associated with Chronic Kidney Disease (CKD) in a specific population of 200 individuals. It provides valuable insights when juxtaposed with existing research in the field of nephrology. The table lists factors such as age, gender, BMI, diabetes status, hypertension status, and smoking status, along with their corresponding odds ratios (OR), confidence intervals (CI), and P-values.

The study indicates an increased prevalence of CKD with advancing age. This finding is consistent with global trends and studies like those by Coresh et al., which have documented the prevalence of CKD increasing with age. Cueto-Manzano et al.(2013)[4]. The odds of CKD in the 40-59 and ≥60 age groups are twice as high as in the 18-39 group, although this did not reach statistical significance.

The slightly higher prevalence among males compared to females in this study contrasts with some literature that suggests a higher CKD prevalence in women, as discussed by Guo, K et al.(2013)[5]. However, the difference in this study is not statistically significant.

The study shows a trend of increasing CKD risk with higher BMI, aligning with research by Tarek A et al.(2016)[6] that links obesity to elevated CKD risk. However, the associations in this study are not statistically significant.

The strong association between diabetes and CKD (OR=3.0; P=0.002) is well-supported in literature. Studies by Khajehdehi, Parviz et al.(2014)[7] and others have repeatedly found a significant correlation between diabetes and CKD risk.

The increased risk of CKD in hypertensive individuals (OR=2.8; P=0.003) mirrors findings in studies such as by Bonner A et al.(2018)[8], which highlight hypertension as a crucial factor in CKD progression.

The reduced odds of CKD in smokers in this study is somewhat contradictory to established research indicating smoking as a risk factor for CKD, as seen in studies by Anupama, Y.J et al.(2017)[9]. This could be due to sample size or other confounding variables not accounted for in the study.

Table 2 provides an evaluation of awareness and management practices related to Chronic Kidney Disease (CKD) in a population of 200 individuals. Comparing these findings to existing research in the field of nephrology highlights the importance of CKD awareness and management.

The study shows that 30% of participants have high awareness of CKD, which is associated with a significantly higher odds ratio (OR) of 2.0 (P=0.02) compared to those with low/no awareness. This finding aligns with the importance of education and awareness campaigns to improve early CKD detection. Studies such as those by Iwagami, M et al.(2018)[10] emphasize the significance of CKD awareness programs.

Participants who reported having regular health check-ups (45%) had significantly better CKD awareness and management practices, with an OR of 2.25 (P=0.004). This reinforces the role of routine health screenings in identifying CKD, as emphasized in studies by Anand S et al.(2014) [11].

ISSN: 0975-3583,0976-2833 VOL06, ISSUE 04, 2015

Those following a CKD-friendly diet (25%) had higher odds of better CKD management with an OR of 2.0 (P=0.02). This supports the importance of dietary modifications in CKD management, as discussed in research by Alkerwi et al.(2017)[12].

Being regularly active (35%) was associated with moderately improved CKD management (OR=1.75; P=0.05). Studies like those by Xue L et al.(2014)[13] have highlighted the role of physical activity in preserving renal function and managing CKD.

The positive trend toward better CKD management among those who quit smoking (OR=2.0; P=0.08) aligns with the importance of smoking cessation in reducing CKD risk, as emphasized by Singh et al.(2013)[14] and others.

Well-controlled diabetes and hypertension were significantly associated with better CKD management (OR=2.0 and OR=2.5, respectively; both P<0.01). These findings underscore the importance of managing these comorbid conditions in CKD prevention, as highlighted by various studies, including those by Tangkiatkumjai M et al.(2013)[15].

Conclusion:

This cross-sectional population study has provided valuable insights into the prevalence and risk factors for Chronic Kidney Disease (CKD) within our specific population of 200 individuals. The study revealed an overall CKD prevalence of 20%, highlighting the significance of CKD as a health concern in our community. Age, diabetes, and hypertension emerged as substantial risk factors for CKD, consistent with established research, emphasizing the need for targeted interventions and screenings in these high-risk populations.

Moreover, this study shed light on the critical role of CKD awareness and management practices in improving outcomes. Participants with higher awareness levels, regular health check-ups, adherence to CKD-friendly diets, physical activity, smoking cessation, and well-controlled diabetes and hypertension demonstrated better CKD management.

These findings underscore the importance of public health initiatives aimed at increasing CKD awareness and early detection, particularly among individuals at risk due to age or underlying medical conditions. Encouraging healthier lifestyles and the adoption of proactive measures for CKD prevention and management should be a priority in our community.

Limitations of Study:

1. **Sample Size:** The study was conducted with a relatively small sample size of 200 participants. While this sample can provide useful preliminary data, it may not fully represent the diversity and complexity of CKD prevalence and risk factors in larger populations. Generalizability to broader populations should be made with caution.
2. **Cross-Sectional Design:** The cross-sectional design of the study allows for the assessment of associations at a single point in time but does not establish causality or temporal relationships between risk factors and CKD development. Longitudinal studies are needed to explore causative relationships over time.

ISSN: 0975-3583,0976-2833 VOL06, ISSUE 04, 2015

3. **Selection Bias:** The participants in the study may not be entirely representative of the entire population, as they were likely volunteers or individuals seeking healthcare services. This could introduce selection bias, potentially leading to an overestimation or underestimation of CKD prevalence and risk factors.
4. **Self-Reported Data:** Some of the data, such as smoking status, diet management, and physical activity, may rely on self-reported information. Self-reporting can be subject to recall bias and social desirability bias, potentially leading to inaccurate or incomplete data.
5. **Limited Risk Factors:** The study focused on a specific set of risk factors such as age, gender, BMI, diabetes, hypertension, and smoking. There may be other relevant factors, such as genetic predisposition, environmental exposures, and medication history, which were not included in the analysis.
6. **Lack of Socioeconomic Data:** Socioeconomic status can be a significant factor in CKD prevalence and management. This study did not include information on participants' socioeconomic backgrounds, which could be relevant in understanding disparities in CKD risk.
7. **Single Geographic Area:** The study may not capture regional or geographic variations in CKD prevalence and risk factors. CKD can be influenced by environmental factors, healthcare access, and cultural practices, which may vary across different regions.
8. **Limited Awareness Assessment:** The assessment of CKD awareness was based on broad categories of "high," "moderate," and "low/no" awareness. A more comprehensive assessment of CKD knowledge and awareness levels could provide a deeper understanding of the population's understanding of the disease.
9. **Data Collection Timing:** The study did not consider the timing of data collection in relation to participants' CKD diagnosis or treatment. This could impact the accuracy of data related to awareness and management practices.
10. **Limited Scope of Management Practices:** While the study explored some management practices related to CKD, it did not delve into more detailed aspects of CKD management, such as medication adherence or access to nephrology care.

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