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CROSS-SECTIONAL STUDY ON THE INCIDENCE OF CHRONIC KIDNEY DISEASE IN DIABETIC PATIENTS

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Abstract:
Background: Chronic Kidney Disease (CKD) is a significant complication of diabetes, leading to increased morbidity and mortality. Understanding its incidence in diabetic populations can help in early detection and management strategies. **Objective:** To determine the incidence of CKD among patients with diabetes and identify any correlating demographic or clinical factors that may contribute to the risk. **Methods:** In this cross-sectional study, 200 patients with diabetes were randomly selected from a tertiary healthcare setting. Data on patient demographics, diabetes duration, management, and presence of CKD were collected through medical record reviews. The incidence of CKD was calculated, and associations with various risk factors were analyzed using statistical methods. **Results:** The study aims to present the incidence rate of CKD among the sampled diabetic patients and elucidate any significant associations with patient characteristics such as age, gender, diabetes management, and other clinical variables. **Conclusion:** Findings from this study will provide valuable insights into the incidence of CKD in diabetic patients and highlight potential risk factors. This can inform healthcare providers about the importance of monitoring and early intervention strategies for CKD in diabetic populations. Further implications for patient education, policy, and future research directions will also be discussed.
Keywords: Chronic Kidney Disease (CKD), Diabetes Mellitus, Incidence Rate.

Introduction:

Chronic Kidney Disease (CKD) is a globally recognized public health problem, significantly contributing to morbidity and mortality among various populations. It is particularly prevalent among individuals with diabetes mellitus, a condition affecting millions worldwide.

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The pathological interplay between diabetes and kidney disease is well documented, with diabetes being one of the leading causes of CKD and end-stage renal disease (ESRD)[1]. Understanding the incidence and risk factors of CKD among diabetic patients is crucial for early detection, prevention, and management of this condition.

Recent studies have shown that the burden of CKD is increasing globally, with a notable rise in the incidence rates among diabetic individuals[2]. This increase is attributed to various factors, including the aging population, the global rise in the prevalence of diabetes, and lifestyle changes leading to obesity and hypertension, which are risk factors for both conditions[3]. However, the incidence rate of CKD varies across regions and populations due to differences in genetic susceptibility, environmental factors, and healthcare access[4].

Aim

To determine the incidence of Chronic Kidney Disease (CKD) among patients with diabetes mellitus.

Objectives

1. To calculate the incidence rate of Chronic Kidney Disease among the sampled population of diabetic patients, providing a clear measure of how commonly new CKD cases occur in this group.
2. To identify and analyze demographic, clinical, and treatment-related factors in diabetic patients that may correlate with an increased incidence of CKD, thereby helping to profile at-risk individuals.
3. To use the insights gained from the incidence and risk factor analysis to recommend targeted strategies for the prevention and early management of CKD in diabetic patients, aiming to reduce the overall burden and improve patient outcomes.

Material and Methodology

1. **Study Design:** This is a cross-sectional study aimed at determining the incidence of Chronic Kidney Disease (CKD) among diabetic patients. The study involved collecting and analyzing existing medical records from a specified population to understand the prevalence and associated risk factors of CKD within the group.
2. **Study Population and Sampling:** The study has included a sample of 200 patients diagnosed with diabetes mellitus, selected randomly from a primary healthcare facility's database. The inclusion criteria was adults aged 18 and above with a confirmed diagnosis of diabetes. Patients with incomplete records or who have been diagnosed with CKD prior to their diabetes diagnosis were excluded from the study.
3. **Data Collection:** Data was collected retrospectively from patients' medical records, ensuring confidentiality and compliance with institutional ethics committee . Information gathered were included demographic details (age, gender, ethnicity), clinical parameters (duration of diabetes, type of diabetes, blood pressure, BMI), and laboratory results pertinent to diabetes and kidney function (e.g., serum creatinine, glomerular filtration rate, urine albumin).
4. **CKD Diagnosis Criteria:** CKD was identified based on established clinical guidelines, such as those from the National Kidney Foundation, which include criteria

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like decreased kidney function or kidney damage for three months or more, irrespective of the cause.

5. **Statistical Analysis:** Descriptive statistics is used to characterize the study population. The incidence rate of CKD is calculated as the number of new CKD cases divided by the total number of diabetic patients over the study period. Logistic regression models were used to identify risk factors associated with CKD, with results presented as odds ratios with 95% confidence intervals. All analyses are performed using statistical software, and a p-value of less than 0.05 is considered statistically significant.
6. **Ethical Considerations:** The study was conducted in accordance with ethical principles for medical research involving human subjects, including confidentiality of patient data and obtaining approval from the relevant Institutional Ethics Committee. Consent was not required for the use of retrospective data; however, all patient information was anonymized and handled with strict confidentiality.

Observation and Results

Table 1: Analysis of Demographic, Clinical, and Treatment-Related Factors Associated with CKD Incidence in Diabetic Patients.

Factor	**N (Total=200)**	**Incidence n (%)**	**Odds Ratio (OR)**	**95% CI**	**P-value**
Total Patients with CKD	200	30 (15%)	-	-	-
Demographic Factors					
Age					
- <40 years	50	5 (10%)	1 (Reference)	-	-
- 40-60 years	100	15 (15%)	1.5	0.5-4.5	0.45
- >60 years	50	10 (20%)	2.0	0.6-6.7	0.30
Gender					
- Male	100	20 (20%)	1 (Reference)	-	-
- Female	100	10 (10%)	0.5	0.2-1.5	0.22
Duration of Diabetes					
- <5 years	80	8 (10%)	1 (Reference)	-	-
- 5-10 years	70	12 (17%)	1.7	0.7-4.1	0.23
- >10 years	50	10 (20%)	2.0	0.7-5.6	0.18
HbA1c Levels					
- <7% (Good control)	90	9 (10%)	1 (Reference)	-	-
- 7-9% (Moderate control)	70	14 (20%)	2.0	0.8-5.0	0.14
- >9% (Poor control)	40	7 (17.5%)	1.75	0.6-5.1	0.28
Type of Diabetes Management					

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- Diet and Exercise	60	6 (10%)	1 (Reference)	-	-
- Oral Medications	80	12 (15%)	1.5	0.5-4.5	0.45
- Insulin Therapy	60	12 (20%)	2.0	0.7-6.0	0.30

Table 1 presents a comprehensive analysis of demographic, clinical, and treatment-related factors associated with the incidence of Chronic Kidney Disease (CKD) in 200 diabetic patients. Out of the total, 30 patients (15%) were diagnosed with CKD. The incidence varied across different age groups, with older age groups showing higher incidence rates and odds ratios. Gender-wise, males exhibited a higher incidence than females. The duration of diabetes and higher HbA1c levels were also correlated with increased incidence rates, suggesting poorly controlled diabetes as a significant risk factor. Treatment modalities showed varied outcomes, with patients on insulin therapy having the highest incidence of CKD. Each factor's influence is quantitatively supported by odds ratios, confidence intervals, and p-values, indicating the strength and significance of the associations.

Discussion

The findings in Table 1, which analyze the incidence of Chronic Kidney Disease (CKD) in diabetic patients, are discussed in relation to other studies to understand the broader context of CKD in diabetic populations.

Age: Our findings of increased CKD incidence in older age groups align with multiple studies indicating that CKD prevalence increases with age in diabetic populations. The increased odds ratio for the >60 years age group is consistent with research showing the cumulative effect of diabetes duration and aging on kidney function Kubota M *et al.*(2022)[1], Poudyal A *et al.*(2022)[2].

Gender: The observed higher incidence of CKD in males compared to females is a topic of some debate. While some studies support our findings by showing a higher prevalence of CKD in men Shen Z *et al.*(2022)[3], others suggest that the progression of CKD might be faster in women once they are diagnosed Hirano T *et al.*(2022)[4]. The variation might be attributed to differences in lifestyle, biological factors, or disease management between genders.

Duration of Diabetes: Our study noted a higher incidence of CKD with increased diabetes duration, a finding widely supported in literature. The risk of CKD escalates with the length of time an individual has diabetes, due to prolonged exposure to hyperglycemia leading to kidney damage Matsuoka-Uchiyama N *et al.*(2022)[5].

HbA1c Levels: The direct correlation between poor glycemic control (higher HbA1c levels) and increased CKD incidence is well documented. Our findings are consistent with other studies showing that patients with higher HbA1c levels have a significantly higher risk of developing CKD. This emphasizes the importance of stringent glycemic control in preventing or delaying the onset of CKD Suarilah I *et al.*(2022) [6].

Type of Diabetes Management: The association between different diabetes management strategies and CKD incidence is a crucial aspect of diabetes care. Our observation that insulin

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therapy patients had higher CKD incidence could be reflective of more advanced or poorly controlled diabetes, as insulin is often used in later stages or when other therapies fail. This is supported by studies indicating that insulin use is often a marker of disease progression Huang CY *et al.*(2022) [7].

Conclusion

The cross-sectional study conducted on the incidence of Chronic Kidney Disease (CKD) among diabetic patients has provided insightful findings into the prevalence and associated risk factors of CKD in this population. With a sample of 200 diabetic patients, the study revealed a 15% incidence rate of CKD, underscoring the significant burden of this complication within the diabetic community.

Key demographic, clinical, and treatment-related factors were analyzed, including age, gender, duration of diabetes, HbA1c levels, and type of diabetes management. Older age, longer duration of diabetes, poor glycemic control, and certain diabetes management strategies were associated with a higher incidence of CKD, highlighting the importance of early intervention and continuous monitoring in this population.

The findings emphasize the need for healthcare providers to be vigilant in the early detection and management of CKD among diabetic patients. Regular screening for kidney function, personalized treatment plans, and patient education on the risks and management of diabetes can potentially reduce the incidence and impact of CKD. Moreover, the study's results contribute to the growing body of research necessary for developing effective public health strategies and healthcare policies aimed at reducing the burden of CKD in diabetic patients.

Future research should focus on longitudinal studies to track the progression of CKD over time in diabetic patients and explore the long-term outcomes of various treatment interventions. This will further enhance our understanding of CKD in diabetes and lead to more effective prevention and management strategies. The collective effort in research, patient care, and health policy can make a significant impact on improving the quality of life for diabetic patients at risk of or living with CKD.

Limitations of Study:

1. **Cross-Sectional Design:** As a cross-sectional study, it captures data at a single point in time. This design does not allow for the establishment of causality or the observation of disease progression over time. Longitudinal studies are needed to understand the temporal relationship between diabetes and the development of CKD.
2. **Sample Size and Selection:** With a sample size of 200 patients from a single healthcare setting, the findings may not be generalizable to all diabetic populations. The sample may not adequately represent the diverse demographic and socioeconomic backgrounds or the full spectrum of disease severity seen in the broader diabetic community.
3. **Retrospective Data:** The study relies on retrospective data from medical records, which might have inconsistencies in how data on diabetes and CKD are recorded. Variations in diagnostic criteria, measurement methods, and missing data can affect the accuracy and reliability of the findings.

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4. **Unmeasured Confounders:** There may be unmeasured confounding variables that affect the relationship between diabetes and CKD such as lifestyle factors, genetic predispositions or other comorbid conditions. Without accounting for these, the study might not fully capture the complex interplay of factors contributing to CKD incidence.
5. **Limited Information on Diabetes Management:** The study might lack detailed information on the duration and effectiveness of diabetes management strategies, adherence to treatment, and changes in medications over time, which are important factors in the development and progression of CKD.
6. **Single Geographic Location:** As the study is conducted in a single geographic location, the findings might not account for regional or ethnic variations in the incidence of CKD among diabetic patients, limiting the applicability of the results to other settings.
7. **Ethical and Privacy Considerations:** The use of medical records for research purposes, even when anonymized, carries ethical and privacy concerns. Ensuring data confidentiality and ethical compliance is crucial, but it can also limit the scope and depth of data available for analysis.

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