

Original Research Article

The prevalence and assessment of chronic kidney disease with diabetes: single center study

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ABSTRACT

Background: The prevalence of chronic kidney disease (CKD) and Type 2 diabetes (T2D) is increasing worldwide, information on Indian populations regarding the CKD patients with T2D is lacking. In this study, we examined the association of gender and age on the prevalence of other complications in CKD with T2D patients.

Methods: A cross-sectional study was conducted at Sri Aurobindo Medical College, from March 2018 to April 2019. Source populations were all patients who came our medicine department for routine check-up.

Results: A total of 163 CKD patients were included in the study. All the patients were randomly divided in two groups 61(37.4%) patients in CKD with T2D case group and 102 (62.5%) patients in CKD control group. Out of this 107 were males (65.6%) and 56 were females (34.3%). Male-to-female ratio and mean age were higher in the CKD with T2D group. The clinicopathological characteristics of CKD patients with T2D are even more complicated and severe disease in many ways.

Conclusions: A male presents was higher as compare to female in CKD with T2D and control group. In present study there is significant difference in older and younger age in CKD with T2D and control group. Age, HNT, CVD, smoking, BMI, and 24-h urinary protein level were identified as possible contributors' factors of CKD patients with T2D.

Keywords: Chronic Kidney disease, Fasting glucose triglyceride, Hemoglobin, Type 2 diabetes, Total cholesterol

INTRODUCTION

Chronic Kidney Disease (CKD) is a global public health problem, and its prevalence is gradually increasing, mainly due to an increase in the number of patients with Type 2 Diabetes (T2D).¹⁻³ In India, more than 60 million people suffer from diabetes, that is, almost 8.3% of the adult population, and by 2030, around 9.4% of the adult population will suffer due to rise in life expectancy and urbanization.⁴ CKD prevalence reached 22.6% in participants aged 60 to 74 years and 44.5% in those aged 75 years or more.⁵ Furthermore, elderly patients with T2D have higher CKD prevalence than those without

T2D.⁶⁻⁹ The incidence and prevalence of CKD increase markedly at older age.^{10,11} Diabetes is often associated with CKD, and for 45% of patients who receive dialysis therapy, diabetes is the primary cause of their kidney failure.¹² Well-documented risk factors for CKD are advanced age, obesity, Hypertension (HTN), and fasting glucose in patients with T2D.¹³⁻¹⁶ CKD develops in approximately 35% of patients with T2D and is associated with increased mortality.¹⁷⁻¹⁹ In addition, CKD is one of several conditions that are common in older people and are associated with an increased risk of cardiovascular disease (CVD).¹⁹⁻²¹ However, most previous studies were not conducted in the older

population. Older patients with T2D have a high risk of CKD not only because of their age but also because they have diabetes.^{13,22-24} But the information on Indian populations regarding the CKD patients with T2D is lacking.²⁵ Hence in this study, we examined the association of gender and age on the prevalence of other complications in CKD with T2D patients.

METHODS

Study design

In this cross-sectional study design was conducted at Sri Aurobindo Medical College, from March 2018 to April 2019. Source populations were all patients who came our medicine department for routine checkup. The study was approved by clinical research and ethics committee of institute. Overall 163 participants completed the medical evaluation and study. There were divided in two groups in this study 61 patients in CKD with T2D cases group and 102 patients in CKD control group. Blood samples were obtained for biochemical test. All the cases in diabetic group were confirmed diabetics who were on treatment for diabetes mellitus. Of relevance to the current analysis, variables collected during the in hospital were age, gender, and other complications, habits (smoking, alcohol, and tobacco chew), lifestyle vegetarian and non-vegetarian, a previous diagnosis of diabetes mellitus, CVD (myocardial infarction or stroke) and pharmacologic treatment for HTN or high cholesterol. Body Mass Index (BMI) was calculated as weight in kilograms (kgs.) divided by height in meters squared; obesity was defined as BMI ≥ 30 kg/m². Three blood pressure measurements were obtained using a standard protocol and HTN was defined as an average systolic or diastolic blood pressure ≥ 140 mmHg or 90 mmHg, respectively, or current use of blood pressure lowering medication.²⁶

Inclusion criteria

- Study reported data from single center
- Study published between from March 2018 to April 2019
- Study reported prevalence of CKD with diabetic
- Study carried out in general population

Exclusion criteria

- Study did not include data who do not give the content
- Study did not report data from Central India
- Study did not determine CKD based on GFR estimation by serum creatinine-based equations

Statistical analysis

Data for continuous variables is presented as mean \pm standard deviation, and categorical factors are reported as percentages. The significance of differences

in measurements among groups was tested using the independent sample t-test, paired t-test, or Mann-Whitney U test for continuous measures and chi-square tests for categorical measures.

RESULTS

A total of 163 CKD patients were included in the study, of which 107 were males (65.6%) and 56 were females (34.3%). (Table 1) Of these patients, 61 also had T2D (CKD with T2D, 37.4%) while 102 did not have T2D (CKD without T2D 62.5%). A male present was higher as compare to female in both groups. There is significant difference in older and younger age in CKD with T2D and CKD without T2D. There is no significant difference between age group (18-30). Systolic blood pressure was also higher in CKD patients with T2D than in those without T2D ($P < 0.001$). There was no significant difference in Diastolic blood pressure. Mean BMI was higher in CKD patients with T2D (25.43 ± 3.38) than in those without T2D (24.28 ± 3.63 , $P < 0.001$) (Table 1).

Table:1 Demographic features of CKD with T2D patient and CKD patient.

Parameter	CKD with T2D case group (n=61)	CKD without T2D control group (n=102)	p value
Age			
18 to 30	5	2	0.0573
31 to 60	22	69	<0.001*
≥ 61 years	34	31	<0.001*
Gender			
Male	44 (72.1%)	63 (61.7%)	0.177
Female	17 (27.8%)	39 (38.2%)	
BMI kg/m ²	28.43 \pm 6.38	24.28 \pm 3.63	<0.001*
Systolic pressure (mmHg)	137.85 \pm 18.17	127.64 \pm 16.80	<0.001
Diastolic pressure (mmHg)	80.70 \pm 10.51	81.06 \pm 11.81	0.213
CKD: Chronic kidney disease, T2D: Type 2 diabetes; BMI: Body Mass Index Data presented in mean \pm standard deviation and number (percentage)			

The CKD patients with T2D were also more likely to have a history of HTN was (27.8%) vs (20.5%), CVD (16.3%) vs (18.6%), Hepatitis (8.1%) vs (6.8%), Arthritis and Thyroid (14.7%) and (13.1%), (11.7%) and (19.6%). In addition, a larger proportion of CKD patients with T2D were smokers (8.1%) compared to CKD patients without T2D (12.7%), Percentages of patients who used alcohol and tobacco chewing (9.8%), (1.6%) compared to CKD patients without T2D (6.8%), (2.9%). More than 70% of the study subjects were nonvegetarians (Table 2).

Table 2: Clinical, and laboratory characteristics of CKD with T2D patient and CKD patient.

Parameter	CKD with T2D case group (n=61)	CKD without T2D control group (n=102)	p value
Previous medical illness			
Hypertension	17(27.8%)	21(20.5%)	0.287
CVD n (%)	10(16.3%)	19(18.6%)	0.718
Hepatitis n (%)	5(8.1%)	7(6.8%)	0.752
Arthritis n (%)	9(14.7%)	12(11.7%)	0.581
Thyroid n (%)	8(13.1%)	20(19.6%)	0.287
Habits			
Smoking n (%)	5(8.1%)	13(12.7%)	0.369
Alcohol n (%)	6(9.8%)	7(6.8%)	0.497
Tobacco chewing n (%)	1(1.6%)	3(2.9%)	0.603
Food Habits n (%)			
Vegetarian	15(24.5%)	24(23.5%)	0.877
Nonvegetarian	46(75.4%)	78(76.4%)	0.877
CKD: Chronic kidney disease, T2D: Type 2 diabetes; CVD: Cardiovascular disease Data presented in mean±standard deviation and number (percentage)			

Table 3: Clinical, and laboratory characteristics of CKD with Diabetes patient and CKD patient.

Parameter	CKD with T2D case group (n=61)	CKD without T2D control group (n=102)	p value
Previous medical illness			
	17(27.8%)	21(20.5%)	0.287
CVD n (%)	10(16.3%)	19(18.6%)	0.718
Hepatitis n (%)	5(8.1%)	7(6.8%)	0.752
Arthritis n (%)	9(14.7%)	12(11.7%)	0.581
Thyroid n (%)	8(13.1%)	20(19.6%)	0.287
Habits			
Smoking n (%)	5(8.1%)	13(12.7%)	0.369
Alcohol n (%)	6(9.8%)	7(6.8%)	0.497
Tobacco chewing n (%)	1(1.6%)	3(2.9%)	0.603
Food Habits n (%)			
Vegetarian	15(24.5%)	24(23.5%)	0.877
Nonvegetarian	46(75.4%)	78(76.4%)	0.877

CKD: Chronic Kidney Disease, T2D: Type 2 Diabetes; CVD: Cardiovascular Disease
Data presented in mean±standard deviation and number (percentage)

The main laboratory findings are shown in Table 3. Notably, laboratory data suggested that CKD patients

with T2D had more complicated and severe disease in many ways. Hemoglobin, total protein, serum albumin, and high-density lipoprotein cholesterol levels were lower in CKD patients with T2D than in those without T2D ($P < 0.001$). Fasting glucose, 24-h urinary protein, serum creatinine, alkaline phosphatase, and triglyceride levels were higher in CKD patients with T2D than in those without T2D ($P < 0.001$). Total cholesterol was lower in CKD patients with T2D than in those without T2D.

DISCUSSION

Increased life expectancy and a higher T2D incidence lead to an increase in the number of older diabetic patients with CKD.¹⁻³ In patients with T2D, CKD significantly increases CVD morbidity and mortality, and it is the main reason for renal replacement therapy.¹⁷⁻²¹ The prevalence of CKD was 19.8% in participants aged 65 years or older, and it is very high compared with 0.7% in those aged 35 to 44 years in urban Korea.¹⁵ All adults with HTN or T2D including those under 50 years of age.²⁷ In present study a male present was higher as compare to female in both groups. There is significant difference in older and younger age in CKD with T2D and CKD without T2D. About 30% of American adults with T2D have elevated spot urine albumin excretion readings of over 30mg/g creatinine.²⁸

The clinicopathological characteristics of CKD patients with T2D are even more complicated. In addition, reduced lipoprotein lipase activity might increase triglyceride and low-density lipoprotein cholesterol levels, and reduce high-density lipoprotein cholesterol levels, in T2D patients.²⁹ In this study CKD patients with T2D had more complicated and severe disease in many ways. Hemoglobin, total protein, serum albumin, and high-density lipoprotein cholesterol levels were lower in CKD patients with T2D than in those without T2D. Total cholesterol was lower in CKD patients with T2D than in those without T2D. Fasting glucose, 24-h urinary protein, serum creatinine, alkaline phosphatase, and triglyceride levels were higher in CKD patients with T2D than in those without T2D. Both systolic blood pressure and the percentage of patients with hypertension-related complications were higher in CKD patients with T2D than in those without T2D, which was consistent with a study of Japanese patients.³⁰ In this study systolic blood pressure was also higher in CKD patients with T2D than in those without T2D. Diastolic blood pressure was not significant in both groups in present study. Patients with both CKD and T2D had a higher incidence of cardiovascular disease than CKD patients without T2D, which is consistent with a previous study.³¹ Increased blood volume and vascular resistance resulting. From insulin resistance in T2D might contribute to the development of HTN.³² In our analysis of factors that might be associated with co-occurrence of CKD and T2D, age, HNT, CVD, smoking, BMI, and 24-h urinary protein level were identified as possible contributors.

However, these factors cannot be confirmed as risk factors for diabetic kidney disease due to limitations of the cross-sectional design used in this study. Previous studies have suggested that age, smoking, BMI, and proteinuria are risk factors for the development of diabetic kidney disease in different patient populations.^{29,33,34}

CONCLUSION

The purpose of this study was examined the association of gender, age and CKD patients with T2D had more complicated and severe disease in many ways. A male presents was higher as compare to female in CKD with T2D and control group. In present study there is significant difference in older and younger age in CKD with T2D and control group. Age, HNT, CVD, smoking, BMI, and 24-h urinary protein level were identified as possible contributors' factors of CKD patients with T2D.

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