Prevalence of Chronic Kidney Disease in Type 2 DM Patients in a Rural Medical College Hospital, Kishoreganj

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Abstract

Background: Chronic kidney disease (CKD), an important, chronic, non-communicable disease is now one of the major public health problems in our country. Diabetes mellitus (DM) is one of the most common causes of CKD in our country. Proper control of DM and early detection of CKD is crucial to prevent its progression, and thereby, to potentially improve its outcome. Number of patients with CKD are increasing day by day. This study was aimed to find out the prevalence of chronic kidney disease in type 2 DM patients in a rural tertiary Medical College Hospital, Kishoreganj.

Methods: A cross sectional study was performed in a tertiary care hospital over one year. Data were collected from 150 diabetic patients of age >40-years age who presented to outdoor and indoor medicine and surgery department of Jahurul Islam Medical College Hospital, Kishoreganj from Jan 2019 to Dec 2019. They were clinically evaluated and underwent relevant investigations.

Results: In this study, 35.33% of the study patients were within age range of 61-70 years with an overall male preponderance (56%). Easy fatigability (45.33%), nocturia (26.67%), gastrointestinal tract disturbances (16.67%), breathlessness (04.67%), and oliguria (04.67%) were the most common symptoms of presentation. Among the signs of chronic kidney disease, pallor (8.67%) was found in majority followed by pedal edema (04.67%), facial puffiness (03.33%) and pulmonary edema (03.33%). BMI was >30 in 36.67% patients. Hyperglycemia was found in 100% patients. HbA1c was >6.5% in 86.67% patients. Uremia was noted in 34.67% of patients. Serum creatinine was >1.2 mg/dL in 38.67% patients. Estimated Glomerular Filtration Rate (eGFR)< 100 mL/min/1.73 m^2 was noted in 38.67% patients. Complete urine analysis showed albuminuria in 38.67% patients. Prevalence of CKD in type 2 DM patients was 38.67%. Based on eGFR, most of the patients were in stage I (12.67%) and stage II (09.33%) of CKD. 8% and 4% patients were found in stage IIIA and stage IIIB respectively. About 4.67% patients were in stage IV and stage V. 41.38% patients with CKD had history of DM for > 10 years.

Conclusion: It is concluded that male patients with type 2 DM of more than 60 years are more prone to develop any type of CKD. A systematic determination of eGFR and Urinary Albumin Creatinine Ratio (UACR) may contribute to an early diagnosis, thus allowing intervention during the initial stages of the disease when treatment is more efficient.

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Introduction

Chronic kidney disease (CKD) has become a major cause of morbidity and mortality in developing countries. It increases the mortality risk for any cause, which increases the frequency of cardiovascular disease episodes and the progression of end stage renal disease. Approximately 40% of the adult population diagnosed or not diagnosed with DM has some degree of CKD in the united states.[1] CKD increases the cost of managing DM.[2] CKD commonly initiates at the prediabetes stage due to its coexistence with other cardiovascular risk factor. CKD is usually present in one third of DM patients.[3]

Worldwide, diabetes mellitus (DM) has become an important public health problem, with its prevalence ranging from 6.9 to 10.2% in developed countries and almost over 7% in the developing countries.[4,5] As per the International Diabetes Federation Atlas (IDFA) for 2015, over 415 million people across the globe are suffering from diabetes.[6] The mortality and morbidity due to DM is attributed to a range of complications, which includes both micro-vascular and macro-vascular complications. One such microvascular complication is diabetic nephropathy, which is characterized by microalbuminuria, which over long period turns into macroalbuminuria, causing overt nephropathy.[7] The glomerular filtration rate (GFR) also deteriorates significantly in this process. If not treated, and addressed medically, nephropathy progresses into chronic kidney disease (CKD).[8,9]

The kidney disease outcomes quality initiative of National Kidney Foundation defines CKD as either kidney damage or decreased glomerular filtration rate <60 mL/min/1.73 m2 for 3 or >3 months.[10] Kidney damage is defined as pathological abnormalities or markers of damage, including abnormalities in blood or urine tests or imaging studies.

Kidney failure is defined as either (1) a level of glomerular filtration rate (GFR) to <15 mL/min/1.73m^2, which is accompanied in most cases by signs and symptoms of uremia, or (2) a need for initiation of kidney replacement therapy (dialysis or transplantation) for treatment for complications of decreased GFR, which would otherwise increase the risk of mortality and morbidity.[11]

Annual screening for CKD in type 2 DM patients including the Urinary Albumin Creatinine Ratio (UACR) and eGFR is recommended at the moment of disease diagnosis. Early identification of CKD would allow immediate intervention, thus diminishing the progression of renal disease and cardiovascular risk. CKD includes diminished eGFR and/or increased UACR, although a considerable percentage of type 2 DM patients present with reduced eGFR without increased UACR.[12]

The objective of this study is to establish the prevalence of CKD and the different stages of CKD in patients with type 2 DM presented in a tertiary care rural hospital in Kishoreganj.

Methods

A cross sectional study of 150 diabetic patients of more than 40-years age group with renal failure more than 3 months was undertaken after ethical clearance and with informed consent who presented to outdoor and indoor medicine and surgery department of Jahurul Islam Medical College Hospital, Kishoreganj from January 2019 to December 2019. Patients with age <40 years, urinary tract infection and acute kidney injury were excluded. After obtaining a detailed history, general physical examination, systemic examination, patients were subjected to relevant investigations. Random blood sugar, blood urea, serum creatinine, HbA1c, complete blood picture, serum electrolytes,

complete urine examination, serum calcium, phosphate, total proteins, albumin, ultrasound abdomen, chest X-ray, electrocardiography were done. In this study, due to unavailability of UACR in our rural hospital, CKD was categorized on the basis of eGFR and albuminuria. In this study, eGFR was measured by using modification of diet in renal disease (MDRD) study formula.[13]

MDRD equation = 175 x serum creatinine(micromol)$^{-1.154}$ x age (years)$^{-0.203}$ x 0.742 (if female)

Statistical Analysis

Descriptive statistical methods were used to summarize the demographic and disease characteristics. For continuous measurements such as age, range and percentage were tabulated and for the categorical measurements such as gender, the frequencies were computed. All data were processed and analyzed manually and by SPSS (Statistical Package for Social Science) 16 windows version.

Results

A total of 150 patients fulfilling inclusion criteria were studied over a period of 1 year. In this study 35.33% of the study patients were within age range of 61-70 years. Male female ratio was 1.27:1 showing males (56%) affected more than females (44%). Easy fatigability (45.33%), nocturia (26.67%), gastrointestinal tract disturbances (16.67%), breathlessness (04.67%), and oliguria (04.67%) were the most common symptoms of presentation. Among the signs of chronic kidney disease, pallor (8.67%) was found in majority followed by pedal edema (04.67%), facial puffiness (03.33%), and pulmonary edema (03.33%). BMI was >30 in 36.67% patients. Hyperglycemia was found in 100% patients. HbA1c was >6.5% in 86.67% patients. Uremia was noted in 34.67% of patients. Serum creatinine was >1.2 mg/dL in 38.67% patients.eGFR< 100 mL/min/1.73 m2 was noted in 38.67% patients. Complete urine analysis showed albuminuria in 38.67%. Hyperphosphatemia was found in 30% patients. Hyperkalemia was found in 23.33% patients. Hypocalcemia was noted in 33.33% patients. Large sized kidneys were present in 26.67% patients based on ultrasonography. Prevalence of CKD in T2DM patients was 38.67%.44.83% patients of CKD were in 61-70 years age group and 65.52% patients were male among CKD patients. Based on eGFR, most of the patients were in stage I (12.67%) and stage II (09.33%) of CKD. 8% and 4% patients were found in stage IIIA and stage IIIB respectively. About 4.67% patients were in stage IV and stage V. 41.38% patients with CKD had history of DM for > 10 years, 34.48% patients had history of DM for 5-10 years and 24.14% patients had history of DM for <5 years.

Table I: Age distribution of patients with type 2 DM (n= 150)

Age (years)	Total number of patients	Percentage (%)
41-50	18	12%
51-60	32	21.33%
61-70	53	35.33%
71-80	28	18.67%
81-90	13	08.67%
>90	06	04%
Total	150	100%

Table II: Sex distribution of study patients with type 2 DM (n= 150)

Sex	Total number of patients	Percentage (%)
Male	84	56%
Female	66	44%
Total	150	100%

Table III: Clinical features of study patients with type 2 DM (n= 150)

Clinical features	Number of patients	Percentage (%)
BMI (kg/m^2) >30	55	36.67%
Easy Fatigability	68	45.33%
Nocturia	40	26.67%
GI symptoms	25	16.67%
Pallor	13	08.67%
Breathlessness	07	04.67%
Oliguria	07	04.67%
Facial puffiness	05	03.33%
Edema	07	04.67%
Features of pulmonary oedema	05	03.33%

Table IV: Investigations findings of study patients with type 2 DM   (n=150)

Investigations	Number of patients	Percentage
RBS > 11.1 mmol/l	150	100%
HbA1c > 6.5%	130	86.67%
Serum Creatinine > 1.2 mg/dl	58	38.67%
eGFR< 100 mL/min/1.73 m2	58	38.67%
Urea > 50 mg/dl	52	34.67%
Urine albumin + and more	58	38.67%
Hb% < 10gm/dl	15	10%
Potassium > 5.3mEq/L	35	23.33%
Calcium < 8.5 mg/dl	50	33.33%
Phosphate > 4.7 mg/dl	45	30.00%
USG KUB (large kidney)	40	26.67%
CXR P/A View- Pulmonary oedema	05	03.33%

Table V: Prevalence of CKD in type 2 DM patients. (n=150)

Diagnosis	No of patients	Percentage
No CKD	92	61.33%
CKD	58	38.67%
Total	150	100%

Table VI: Stages of CKD patients with type 2 DM (n= 58)

Stages	eGFR	No of patients	Percentage
Stage- I	> 90 mL/min/1.73 m2	19	12.67%
Stage-II	60-89 mL/min/1.73 m2	14	09.33%
Stage-III A	45-59 mL/min/1.73 m2	12	08.00%
Stage-III B	30-44 mL/min/1.73 m2	06	04.00%
Stage-IV	15-29 mL/min/1.73 m2	04	02.67%
Stage-V	< 15 mL/min/1.73 m2	03	02.00%
	Total	58	38.67%

Table VII: Age distribution of type 2 DM patients with CKD (n=58)

Age (years)	No of patients	Percentage
41-50	04	06.89%
51-60	07	12.10%
61-70	26	44.83%
71-80	12	20.69%
81-90	06	10.34%
>90	03	05.17%
Total	58	100%

Table VIII: Sex distribution of type 2 DM patients with CKD (n=58)

Sex	Total no patients	Percentage
Male	38	65.52%
Female	20	34.48%
Total	58	100%

Table IX: Duration of type 2 DM patients with CKD (n=58)

Duration of DM	No of patients	Percentage
<5 years	14	24.14%
5-10 years	20	34.48%
>10 years	24	41.38%
Total	58	100%

Discussion

The present study was done over a period of 1 year, included 150 diabetic patients of more than 40-years age group with renal failure more than 3 months and was assessed clinically and biochemically to find out the prevalence of CKD in type 2 DM patients. In this study, 35.33% of the study patients were in 61 to 70 years. Male female ratio was 1.27:1 showing males (56%) affected more than females (44%). In this study, prevalence of CKD in type 2 DM patients was 38.67%. 44.83% patients of CKD were in 61-70 years age group and 65.52% patients were male among CKD patients. Based on eGFR, most of the patients were in stage I (12.67%) and stage II (09.33%) of CKD. 8% and 4% patients were found in stage IIIA and stage IIIB respectively. About 4.67% patients were in stage IV and stage V. 41.38% patients with CKD had history of DM for > 10 years, 34.48% patients had history of DM for 5-10 years and 24.14% patients had history of DM for <5 years.

United States Renal Data System 2004 annual data report revealed that the incidence rate of ESRD (stage V CKD) is higher for males with 409/million population compared to 276 for females.[10] Rodriguez et al. observed a higher frequency of CKD in males in their study.[14] L.M. Lou Arnal et al. conducted a cross-sectional study that showed predominance in males (59.5%) than females (40.5%).[15] In our study majority of patients were male (56%).

Wu B et al. conducted a cross sectional study in US in 2015. In their study, the prevalence of CKD in type 2 DM patients was 38.30%. 9.1% patients were in stage I, 9.4% were in stage II, 11.2% were in stage III A, 5.5% were in stage III B, 2.4% were in stage IV and 0.7% patients were in stage V CKD.[16] Rodriguez et al. found a prevalence of 27.9%

of CKD in type 2 DM patients in Spain in 2013. Most of the patients were in stage IIIA (11.6%)in their study.[14]

L.M. Lou Arnal et al. conducted a cross sectional study in Spain in 2010. In their study, the prevalence of CKD in type 2 DM patients was 34.60%. In their study, 1.7% patients were in stage I, 7.7% were in stage II, 18.8% were in stage III A, 5.5% were in stage III B, 0.8% were in stage IV and 0.1% patients were in stage V CKD.[15]

Baily et al. found a prevalence of 43.5% of CKD in type 2 DM patients in US in 2014. In their study, most of the patients were in stage II (38.3%) and stage I (34.7%).[17] In START India study, Rajput et al. found a prevalence of 48.4% of CKD in type 2 DM patients in 2017. In their study, most of the patients were in stage II (47.8%) and stage I (28.1%).[18]

The prevalence of CKD in type 2 DM patients in the present study was more or less same as any other study. Most of the patients were in stage I and II in our study including many other studies probably due to increase consciousness of patients about the fatal complications of CKD.

Conclusion
Chronic kidney disease is a worldwide public health problem, both for the number of patients and cost of treatment involved. Globally, CKD is the 12th cause of death and the 17th cause of disability, respectively.[19]It is concluded that male patients with type 2 DM of more than 60 years are more prone to develop any type of CKD irrespective of duration of type 2 DM. A systematic determination of eGFR and UACR may contribute to an early diagnosis, thus allowing intervention during the initial stages of the disease when treatment is more efficient.

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