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Chronic Diabetes Type 2; Screening for Chronic Kidney Disease at Sample of Iraqi Patients

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Original Article

Abstract

Background: *Type 2 diabetes mellitus (T2DM) is one of the ten chronic non-communicable diseases that constitute the main causes of death and disability in the world. According to estimates, it is expected that by 2040 there will be 642 million people with diabetes, that is, 6 times more than the number of people reported in 1980 (108 million) and 1.5 times more than in 2014 (422 million).*

Objective: *To ascertain the prevalence and severity of chronic kidney disease (CKD) among individuals diagnosed with type 2 diabetes mellitus within a representative sample of patients from Iraq.*

Patients and methods: *A descriptive cross-sectional study was conducted including diabetes patients who were receiving care at the outpatient clinic of our hospital. The study population consisted of individuals who had been diagnosed with type 2 diabetes for a duration of five years and did not have chronic kidney disease resulting from any other underlying conditions.*

Results: *The average GFR in the absence group of CKD was 88.6 ± 13.5 and in the group with the presence of CKD it was 36.9 ± 14.16 with a p = 0.000. The average glucose in the group without CKD was 155.08 ± 62.06 and in the group with the presence of CKD was 133.2 ± 68.1 with a p = 0.020. The average urea in the group absence of CKD was 33.3 ± 15.2 and in the group with the presence of CKD it was 72.8 ± 31.4 with a p = 0.000.*

Conclusion: *The estimated incidence of suspected chronic kidney disease (CKD) in our study is 21%. It has been observed that approximately one in five diabetic patients with a disease duration of 5 years have a decline in glomerular filtration rate (GFR).*

Keywords: *chronic kidney disease, type 2 DM, glomerular filtration rate*

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1. INTRODUCTION

Diabetes mellitus is a very important health problem and represents one of the main causes of death and disability in the world, affecting people of productive age and reducing their life expectancy. The International Diabetes Federation (IDF) estimated in 2017 a prevalence of diabetes mellitus of 425 million adults between the ages of 20 and 79 years, with a calculated global prevalence of 8.8%. If this trend continues, by 2045, there will be 629 million people with diabetes mellitus. The greatest increase will occur in regions where the economy shifts from low-income to middle-income; Additionally, the number of working-age people with diabetes mellitus is expected to increase to 438.2 million. The prevalence by gender is estimated at 8.4% in women and 9.1% in men, with the highest prevalence in the 65 to 79 year-old group. The five countries with the highest number of people with diabetes mellitus in descending order are: China, India, the United States, Brazil and Mexico (1-4). CKD has become a public health problem worldwide, with a prevalence increasing and is associated with cardiovascular diseases and diabetes mellitus (5). Abusaib M, et al. revealed that around 1.4 million of Iraqis have diabetes. Reported T2DM prevalence in Iraq ranges from 8.5% (IDF—age-adjusted) to 13.9%. (6) The main cause of renal failure in Iraq was the Diabetes mellitus in a ratio of (33%) followed by hypertension in (22.6%) (7). The prevalence of diabetic nephropathy in Iraqi patients with type 2 DM was 16.1% (8). The Kidney Disease Improved Global Outcomes (KDIGO) identifies CKD as a decreased glomerular filtration rate (GFR) with <60 ml/min accompanied due to structural or functional abnormalities present for more than three months, with implications for health and is classified into five different stages according to GFR and albuminuria (9). The diagnosis of CKD requires a complete clinical history, complete physical examination, and auxiliary laboratory studies"CKD is asymptomatic in the early degrees, which translates into an underdiagnosis of the problem and late referral to the nephrologist." These patients may report hematuria, foamy urine, nocturia, and pain in the buttocks (9, 10). The key tools for the diagnosis of CKD are: measurement of albumin in urine and GFR estimation. Albuminuria is an early marker of nephropathy diabetic (11). Measurement of serum creatinine and 24-hour urine collection with clearance creatinine are not ideal instruments. The best way to estimate GFR is to use of MDRD-4 or CKD-EPI equations, the latter has the advantages of greater accuracy for measure GFR (especially between 60-90

ml/min/1.73m2), mortality and cardiovascular risk prediction. One drawback of the MDRD-4 equation is its reduced accuracy when applied to glomerular filtration rates over 60 ml/min per 1.73 m2. As a result, there is a possibility that persons with mild renal insufficiency may experience misdiagnosis and misclassification of chronic kidney disease (CKD) (12,13). The CKD-EPI formula is more precise and its use reduces the prevalence of CKD, but identifies cases in the high-risk population (14). The CKD-EPI equation is a useful screening tool, so it should replace MDRD-4 in practice (15). Albuminuria is measured by the albumin/creatinine ratio in an isolated urine sample. It is staged: A1 < 30 mg/g, A2 30-300 mg/g and A3 > 300 mg/g (16). CKD screening should be performed at least once a year under the following conditions: Type 1 DM with 5 years of evolution, cardiovascular disease, > 60 years, obesity, first-degree relatives with kidney diseases, obstructive urinary tract diseases (17). The objective of this study is to ascertain the prevalence and severity of chronic kidney disease (CKD) among individuals diagnosed with type 2 diabetes mellitus within a representative sample of patients from Iraq.

2. PATIENTS and METHODS

A descriptive cross-sectional study was carried out, where diabetic patients of the outpatient clinic of our hospital. Patients with a 5-year history of type 2 diabetes, without CKD due to other causes, were included. Etiology, laboratories and complete file, without replacement treatment for renal function. The sample size (n = 263) was calculated with the population average formula with a 95% confidence level, power of the study: The sampling technique used was simple random, using the nominal list of diabetics. Sociodemographic variables were analyzed (sex, age, comorbidities, years of evolution of diabetes, high blood pressure and treatment) and the characteristics of CKD (glomerular filtration rate calculated with the CKD-EPI equation, glucose, creatinine, urea, proteinuria). With prior authorization from the Research Ethics Committee, access to the patients files was requested for the descriptive analysis plan used frequencies and percentages, mean with standard deviation (normal distribution), Chi square test for qualitative variables, Student's t distribution for quantitative (continuous) variables. After the data were reviewed many times by the researchers we used SPSS version 25, many statistical test were used to compare between studied groups (Chi

square test, Fisher's exact test, Student's t distribution), Kolmogorov-Smirnov test to assess the distribution of the variables; $p < 0.05$ statistically significant.

3. RESULTS

The KDIGO categorization system delineates five distinct stages of chronic kidney disease (CKD). The findings pertaining to the level of glomerular filtration were as follows: stage 1 exhibited a percentage of 39.5%, stage 2 had a percentage of 38.8%, stage 3a accounted for 8%, stage 3b represented 5.7%, stage 4 constituted 6.8%, and stage 5 comprised 1.1% (**Table 1**). When analyzing the socio-demographic characteristics and the laboratories by presence or absence of CKD, we obtained the following results: proteinuria with CKD: 26 (60.5 0%), proteinuria without CKD: 17 (39.5%), without proteinuria or CKD: 189 (85.8%), with CKD without proteinuria: 31 (14.1%) with a p value = 0.000 (**Table 2**). The average age of the population was 63.8 ± 11.27 in the group with no CKD and 69.26 ± 11.01 in the CKD group with a p = 0.002, in the comparison of the groups that was carried out. The female gender predominated with 123 participants (84.2%) in the group of absence of CKD and with 23 (15.8%) in the group with CKD. The male gender had 83 participants (70.9%) in the group without CKD and 34 (29.1%) with CKD, with p = 0.011. Regarding blood pressure (BP), 156 patients (82.1%) had absence of CKD and BP controlled, 34 (17.9%) with CKD and controlled BP; 50 (68.5%) without CKD with uncontrolled BP and 23 (31.5%) with CKD and uncontrolled BP; with p = 0.02. Comorbidities were: 35 (100%) with absence of CKD and without comorbidities, 171 (75%) with absence of CKD and comorbidities, and 57 (25%) with CKD and comorbidities with a p = 0.000. The average of creatinine in the group without CKD was 0.77 ± 0.15 and in the group with presence of CKD was 1.95 ± 0.89 with a p = 0.000. The average GFR in the absence group of CKD was 88.6 ± 13.5 and in the group with the presence of CKD it was 36.9 ± 14.16 with a p = 0.000. The average glucose in the group without CKD was 155.08 ± 62.06 and in the group with the presence of CKD was 133.2 ± 68.1 with a p = 0.020. The average urea in the group absence of CKD was 33.3 ± 15.2 and in the group with the presence of CKD it was 72.8 ± 31.4 with a p = 0.000. The average number of years of evolution of type 2 diabetes in the group without CKD was 13.7 ± 6.6 and in the group with the presence of CKD it was 17.7 ± 9.1 with a p = 0.000 (**Table 2**).

Table 1. Frequency and percentage of patients with type 2 diabetes, classified by stage according to with the Kdigo

Degree of glomerular bleeding (CKD-EPI) N=263	No.	%	CI 95 %	
			Lower	Upper
G1	104	39.5	34.2	45.6
G2	102	38.8	32.7	44.5
G3a	21	8	4.9	11.4
G3b	15	5.7	3.4	8.7
G4	18	6.8	3.8	9.9
G5	3	1.1	0.0	2.7

Descriptive statistics of frequencies and percentages, with 95% confidence intervals. G1: ≥ 90 ml/min/1.73 m^2. G2: range from 60-89 ml/min/1.73 m^2. G3a: range from 45-59 ml/min/1.73 m^2. G3b range from 30-44 ml/min/1.73 m^2. G4: range from 15-29 ml/min/1.73 m^2. G5 < 15 ml/min/1.73 m^2.

Table 2. Socio-demographic and laboratory characteristics of patients with type 2 diabetes mellitus, with presence or absence of CKD

Variables		no CKD group		CKD group		P. value
		No.	%	No.	%	
Age (years) (mean± SD)		63.8±11.27		69.26±11.03		0.002
Sex	Female	123	84.2	23	15.8	0.01
	Male	83	70.9	34	29.1	
Arterial hypertension	Controlled*	156	82.1	34	17.9	0.02
	Uncontrolled	50	68.5	23	31.5)	
Comorbidity	Absence	35	100	0	0.0)	<0.001
	Present	171	75.0	57	25.0	
Creatinine (mg/dl) (mean± SD)		0.77±0.15		1.95±0.89		<0.001
Glomerular filtration (ml/min/1.73$m^{2)}$ (mean± SD)		88.6±13.5		36.9±14.16		<0.001
Glucose(mg/dl) (mean± SD)		155.08±62.06		133.2±68.1		0.02
Urea(mg/dl) (mean± SD)		33.3±15.2		72.8±31.4		<0.001
Years of diabetes evolution (mean± SD)		13.7±6.6		17.7±9.1		<0.001

*Controlled patient with systemic arterial hypertension <130/80 mm Hg and uncontrolled 130/80 mmHg.

4. DISCUSSION

The prevalence of CKD in our study was 21.6%, which is different from what has been reported by Laclé-Murray and Valero (2009) have reported a 33.6% prevalence of nephropathy. (18) Low SK, et al. study found that the prevalence of CKD in patients with T2DM was 53%. Which is may be attributed to the difference in sample size collection (19). Progression to end-stage CKD is significantly higher in patients with albuminuria compared to those without (20), although not all patients with some degree of CKD have proteinuria. As an interesting fact from our study, there were more women in the group without CKD than men, but there were more men (60%) with CKD than women (40%). At a global level There is a higher prevalence in women, but a more rapid progression in men (21). There is a statistical association between high blood pressure and CKD and it should be remembered that this can be both cause and effect. The prevalence of arterial hypertension in CKD is range from 60% to 90% (22). A relationship between elevated serum creatinine and urea levels with a lower GFR. Regarding glucose levels in both groups, a lack of control was observed metabolic. The average number of years of evolution of type 2 diabetes in patients with some degree of CKD was higher compared to the group without the disease, the more years of evolution, that is more likely to find CKD data, but in case of finding a patient with a diagnosis simultaneous diabetes and CKD, CKD is probably not of diabetic etiology and they would have to look for other causes (23). It is widely and erroneously thought that only with an isolated serum measurement of creatinine can be diagnosed in a timely manner, when it must be corroborated by the three months with the estimation of the GFR by equations such as the CKD-EPI screening in diabetics. It should be performed at least once a year, starting from the moment of diagnosis (24). The limitations we had in the study are that there was no measurement of albuminuria (excellent screening tool) or the albumin/creatinine ratio. The patients that resulted in stage G3 to G5 did not have a definitive diagnosis of CKD, so they were has to be confirmed after three months, although we must continue with the promotion of healthy lifestyles and timely detection, mainly in high-risk populations (25).

5. CONCLUSIONS

The estimated incidence of suspected chronic kidney disease (CKD) in our study is 21%. It has been observed that approximately one in five diabetic patients with a disease duration of 5 years have a decline in glomerular filtration rate (GFR). However, it is important to note that the diagnosis of CKD cannot be made until the presence of kidney damage is evaluated and confirmed after a period of three months.

Ethical Clearance:

Ethical issues were taken from the research ethics committee. Informed consent was obtained from each participant. Data collection was in accordance with the World Medical Association (WMA) declaration of Helsinki for the Ethical Principles for Medical Research Involving Human Subjects, 2013 and all information and privacy of participants were kept confidentially.

Conflict of interest: Authors declared none

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