The prevalence of diabetes kidney disease in type one diabetes patients in King Fahad Medical City in Riyadh
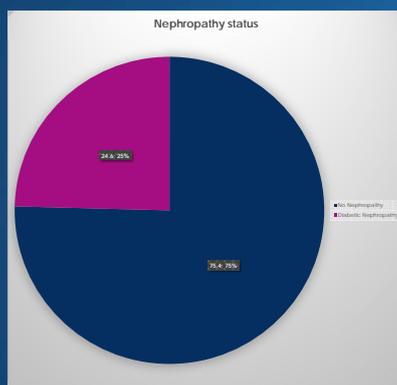
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Background

➢ Saudi Arabia is one of the countries with a high incidence and prevalence of type 1 diabetes mellitus (T1DM) in children and adolescents.

➢ It is one of the top ten countries around the world; 8th in the prevalence by 35000 patients (<20years) and 4th regarding the incidence by 33.5 (<20 years) per 100,000 children per year; most of the cases of T1DM were documented in urban areas (77.2%).

➢ T1DM is associated with micro- macrovascular complications, including nephropathy. Saudi Arabia has a higher rate of these complications.

➢ The incidence of end-stage renal disease (ESRD) due to diabetes has increased dramatically during the past few decades, and screening and early intervention are essential preventative measures.

Methods

➢ This is a cross-sectional study of 344 Saudi patients with T1DM who were randomly selected from those who attended the diabetes clinic in the period between January 2017 and January 2019.

➢ Subjects were divided into 2 groups according to the albumin/creatinine ratio (ACR, mg/mMol) as follows : having no diabetic nephropathy (no DN), if ACR was less 3.5 for females and < 2.5 for males or having diabetic nephropathy (DN) if ACR was = or > 3.5 (females) and ACR = or > 2.5 (males) .

➢ The estimated Glomerular filtration rate (eGFR) was calculated using the CKD-EPI equation, and subjects were further divided into the different CKD stages.

Table 1. Comparison of the clinical characteristics of patients with and without nephropathy

	Nephropathy status	N	Mean	Standard Deviation	P value
Age	No nephropathy	197	25.09	9.23	
	Nephropathy	63	24.16	10.79	0.5
DM duration	No nephropathy	195	11.92	6.72	0.79
	Nephropathy	62	12.18	6.51	
SBP	No nephropathy	193	122.16	12.73	
	Nephropathy	64	127.34	12.98	0.005
DBP	No nephropathy	193	72.85	8.79	
	Nephropathy	64	77.28	10.35	0.001
Weight , kg	No nephropathy	192	67.55	16.02	
	Nephropathy	63	65.20	17.85	0.3
BMI	No nephropathy	192	26.22	7.03	
	Nephropathy	63	25.41	6.95	0.8
HbA1c	No nephropathy	196	9.26	1.61	
	Nephropathy	63	10.66	2.35	0.001
T Chol	No nephropathy	188	4.60	.85	
	Nephropathy	63	5.2	1.01	0.001
TG	No nephropathy	188	1.05	.71	
	Nephropathy	63	3.29	15.60	0.05
HDL-C	No nephropathy	188	1.37	.34	0.07
	Nephropathy	63	3.92	19.86	
LDL-C	No nephropathy	187	2.86	.74	
	Nephropathy	63	3.35	.88	0.001

Nephropathy status

No Nephropathy 75.4 75%
Diabetic Nephropathy 24.6 25%

Objectives

➢ This study aimed to evaluate the prevalence and predictors of diabetic kidney disease in subjects with type 1 diabetes mellitus (T1DM) attending King Fahad Medical City, Riyadh, Saudi Arabia.

Results

• The mean age of the study population was 24.6 ±9.5 yrs, 65.5 % were females and mean DM duration was 12.1 ± 0.3 yrs, mean HbA1c was 9.5 ±0.1 % and mean systolic BP was 123 ±0.7, and mean serum creatinine was 59.8 ± 3.8. BMI was 25.9 ± 0.36.

• About 24.5 % of the subjects had nephropathy and the distribution of the different stages of CKD was as follows in this group: 90.6 % had stage 1 CKD (eGFR > 90 ml/min), 7.8 % had stage 11 CKD (eGFR between 60-89), 1.6 % had stage IV CKD (eGFR 15-29).

• Patients with DN had significantly higher HbA1c 10.7±0.3 vs 9.3 ± 0.1, respectively, P <0.001, higher systolic BP (127 ± 1.6 Vs 122 ± 0.9 mmHg, respectively, P <0.001, and higher total cholesterol 5.2± 0.1 vs 4.5 ±0.1, respectively, P 0.02, compared to subjects without DN.

• Binary regression analysis showed that DN was independently associated with total cholesterol , odd ratio = 1.67, 95 % C.I. (1.13-2.47), P-value 0.009, HBA1c with an odds ratio =1.38, 95 % C.I. (1.2-1.7), P-value <0.001 and systolic BP, odds ratio = 1.03, 95 % C.I (1.0-1.06), P= 0.02 even after correction for age, gender, BMI, and DM duration.

Table 2. Predictors of diabetic nephropathy among type 1 diabetic patients: Logistic regression analysis

	B	S.E.	p-value	Adjusted OR	95% C.I .for AOR Lower	95% C.I .for AOR Upper
SBP	.032	.014	.020	1.032	1.005	1.060
HbA1c	.358	.093	.000	1.430	1.191	1.717
t_chol	.516	.199	.009	1.675	1.135	2.472
tg level	.059	.105	.570	1.061	.865	1.302
hdl_c	.068	.410	.868	1.070	.479	2.393
Constant	-11.382	2.240	.000	.000		

Discussion

➢ The present study determined the prevalence and predictors of diabetic nephropathy among type 1 diabetic patients.

➢ The present study revealed a prevalence of 24.5% for diabetic nephropathy, which coincides with others who documented that DKD occurs in 20-40% of all diabetes patients. But it looks high percent compared with some studies like The European Diabetes Prospective Complications Study Group and 18-year Danish study, which reported an overall occurrence of microalbuminuria after 7.3 years in patients with T1DM 12.6%. However, the proteinuria rate in T1DM ranged between 15% and 40% after 15-20 years.

➢ In one of the most common landmark studies of T1DM complications (The Diabetes Control and Complications Trial "DCCT") compared the effects of intensive vs. conventional control on the onset and progression of diabetes complications in 1441 subjects with type 1 diabetes over 6.5 years. It was found that microalbuminuria onset was significantly less in the intensive insulin group than the control group, 16.4% vs. 23.9%, respectively. Also, macroalbuminuria was significantly less in the intensive insulin group than the control group, 3.2% vs. 7.2%, respectively.

➢ In the current study, the predictors for diabetic nephropathy, after controlling for the confounding effect, were high total cholesterol, high HBA1c, and high systolic BP. Others have reported the same on both local and international levels.

➢ Two important limitations of the present study were a cross-sectional design that proves association and not causality and the conduction of the study in the KFMC healthcare setting, which could impact the generalizability of results overall population of type 1 diabetes in Riyadh, Saudi Arabia.

How to improve ?

➢ Screening of diabetic 1 diabetic patients for nephropathy for early intervention is warranted.

➢ Control of hypertension, blood glucose and cholesterol levels are highly recommended.

➢ Further larger scale longitudinal study including patients from other disciplines in Riyadh to have a more comprehensive profile.

Conclusions

➢ The prevalence of DN in this cohort of patients with T1DM is about 25 %, most of whom have preserved eGFR.

➢ Poor glycemic control, poor systolic BP control, and poor lipid profile are emerging risk factors and are independently associated with DN occurrence and should be aggressively treated to reduce the prevalence of DN and progression to end-stage renal disease.

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