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Risk Factors of Chronic Kidney Disease among Patients Attending Ibn Sina Teaching Hospital in Mosul City

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Abstract

Background Chronic kidney disease (CKD) is a long-term health condition that in many cases is preventable. Many people do not know they have kidney disease, because up to 90% of kidney function can be lost before symptoms are evident. Fortunately, simple tests performed by a general practitioner can identify most cases of CKD when the disease is in its early stages, enabling treatment to prevent or slow progress.

Objective To evaluate the risk factors for the development of CKD.

Methods A case-control study conducted to 300 persons (150 cases and 150 controls) selected from Medical Wards, Dialysis Kidney Unit and in Outpatient Clinic at Ibn Sina Teaching Hospital in Mosul City.

Results Diabetes mellitus (DM) had 12.9 folds risk for developing of CKD and both type 1 and type 2 D.M. had significant role for developing CKD. Diabetic patients for (> 15 years) had 29.8 times risk for development of CKD. Hypertension (HT) had 3.5 folds risk for CKD and those having HT more than 15 years had 12.9 times risk for CKD. Cardiovascular disease (CVD) had 13.6 folds risk for CKD and having more than one type of CVD had 37 times risk for CKD than heart failure, ischemic heart disease. Family history of renal diseases had 7.1 times risk for CKD and there was statistically significant role of having family history of CKD that had more than 22 times risk for CKD. Statistically significant role of having proteinuria with 383 times risk for CKD.

Conclusion There are many risk factors significantly contributing to the development of CKD in Mosul especially DM, HT, CVD, family history of renal disease, family history of chronic diseases, and from this study it has been concluded that proteinuria plays a major role for the development and progress of CKD.

Keywords Chronic kidney disease, risk factors

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List of abbreviations: ACEI = Angiotensin converting enzyme inhibitor, AKI = Acute kidney injury, ARB = Angiotensin receptor blocker, BPH = Benign prostatic hyperplasia, CAD = Coronary artery disease, CKD = Chronic kidney disease, NSAID = Non-steroidal anti-inflammatory drugs, RA = Rheumatoid arthritis, SLE = Systemic lupus erythematosus, UTI = Urinary tract infection

Introduction

Chronic kidney disease (CKD) refers to all conditions of the kidney, lasting more than three months, where a person has had evidence of kidney damage and/or reduced kidney function. Evidence of kidney damage manifests as either proteinuria or albuminuria, hematuria or scarring detected by imaging tests [1,2] (Table 1).

KDOQI guidelines have classified CKD into five stages (Table 2).

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Table 1. Criteria for definition of chronic kidney disease [3]

CKD is defined as abnormalities of kidney structure or function, present for more than 3 months, with implications for health. These may include the following:	
Markers of kidney damage	❖ Albuminuria (Alb. Excretion Rate ≥ 30 mg/24 h; Alb. To Creatinine Ratio ≥ 30 mg/g (≥ 3 mg/mmol]) ❖ Urine sediment abnormalities (Pyuria, haematuria, cast) ❖ Electrolyte and other abnormalities caused by tubular disorders ❖ Abnormalities detected through histology ❖ Structural abnormalities detected through imaging ❖ History of kidney transplantation
Decreased GFR (Glomerular Filtration Rate)	GFR <60 ml/min/1.73 m^2

Table 2. Stages of chronic kidney disease based on estimated glomerular filtration rate [3,4]

eGFR (mL/min/1.73m^2)	**Description**	**Clinical Action Plan**
90	Stage 1 CKD - Kidney damage with normal kidney function	Establish etiology of CKD Diagnose and treat cardio vascular disease (CVD) risk factors and comorbid conditions
60-89	Stage 2 CKD - Kidney damage with mild decrease in kidney function	Estimate CKD progression rate Diagnose and treat CVD risk factors and comorbid conditions
45 - 59	Stage 3a CKD - mild-moderate decrease in kidney function	As above, plus: Kidney imaging study, e.g., US or CT Consider nephrology consultation
30-44	Stage 3b CKD - moderate-severe decrease in kidney function	As above plus: Refer patients with diabetes to nephrology
15 - 29	Stage 4 CKD - severe decrease in kidney function	Nephrology consultation with transition of management and care Initiate decisions regarding kidney replacement therapy, vascular access, and kidney transplant Diagnose and treat CVD risk factors and comorbid conditions Adjust drug dosing for CKD stage
< 15	Stage 5 CKD - ESKD	As above plus: Referral to a nephrologist

The risk factors for progression to CKD are divided into non modifiable & modifiable factors.

A- Non modifiable risk factors:

- Age (older age)
- Gender (generally worse in males)
- Race or Ethnicity (non-Caucasian)
- Genetics like adult polycystic kidney disease
- Family history of renal disease
- Family history of chronic disease (Diabetes mellitus (DM), hypertenstion (HT), dyslipidemia & heart disease)

B- Modifiable risk factors:

- Obesity or metabolic syndrome
- Smoking
- Residence
- Low socioeconomic status & low levels of education
- Diabetes mellitus
- Systemic hypertension
- Cardiovascular disease
- Dyslipidemia
- Nephrotoxic agents: NSAIDs, analgesics, aminoglycosides, ACEI, and radiographic contrast media.
- Autoimmune disease: SLE, RA, vasculitis
- Previous episode of acute renal failure
- Proteinuria
- Abnormal urinary sediment
- Structural abnormalities of the urinary tract
- History of obstructive uropathy (renal stone, BPH, malignancy)
- History of recurrent UTI and pyelonephritis

The progression of CKD is demonstrated in the figure 1.

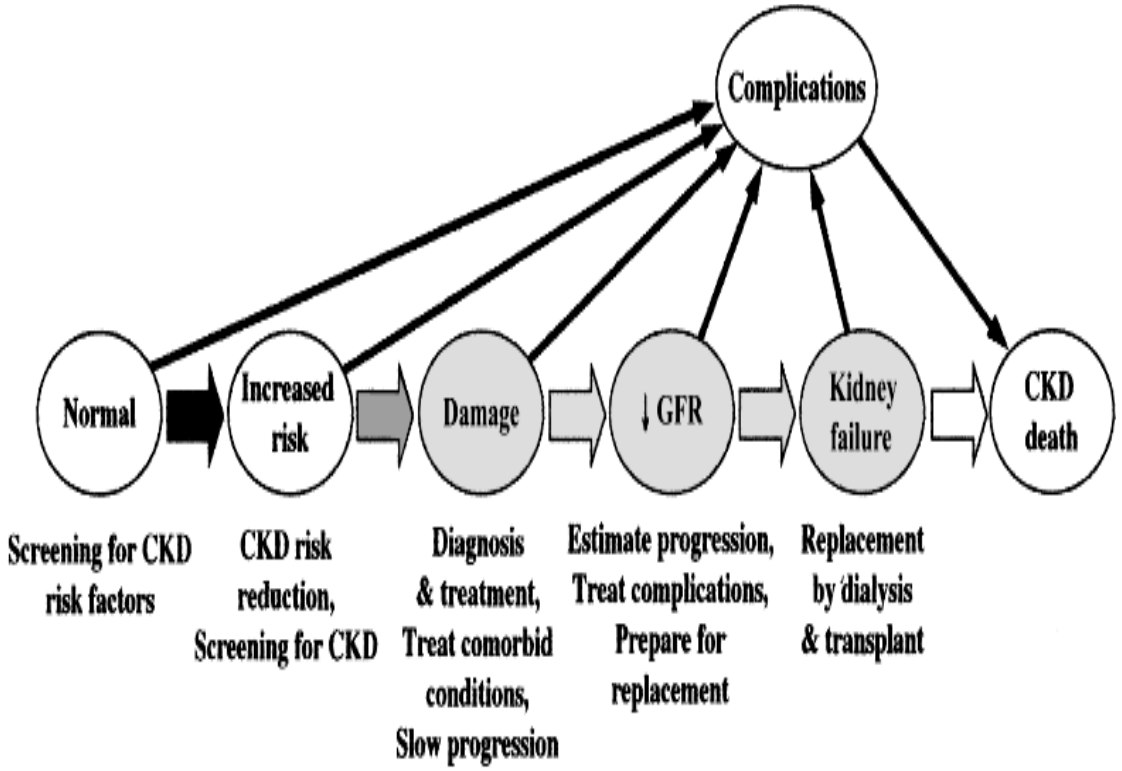

Figure 1. Stages in progression of chronic kidney disease and therapeutic strategies [5]

This study aimed to assess the risk factors that contribute to the development & progression of CKD.

Methods

Settings & study design

The present study was conducted in the Medical Wards and Dialysis Kidney Unit at Ibn Sina Teaching Hospital in Mosul city. This hospital is located in the right bank of Tigris River and it delivers services to many patients in Mosul city. This hospital has 3 medical wards for male and female adults' patients, each medical ward has 66 beds, also include dialysis kidney unit.

A Case control design was adopted to 300 persons (150 cases and 150 controls) in order to achieve the objective of the present study.

Ethical consideration

An official agreement was obtained from the Ministry of Health and Directorate of Health in Mosul before conduction of the study. A verbal consent was taken from all the cases and controls included in the study.

Case and control definition

Case: patient, aged > 18 years old, admitted to the Medical Wards or Dialysis Kidney Unit at Ibn Sina Teaching Hospital who is a known case of CKD diagnosed by his specialist.

Control: patient, aged > 18 years old, admitted to the Medical Wards at Ibn Sina Teaching Hospital & proved that he is not having CKD by estimation of GFR.

Both cases and controls were randomly collected (in a lottery method) during the study period (from 1st of February 2016 to 31st of July 2016).

Inclusion criteria

Those patients with CKD & aged > 18 years old.

Exclusion criteria

Those with present AKI (Acute kidney Injury).

Retrieving data

The main source of data was obtained directly from the cases and controls by the investigator through direct interview with the patients, from their case sheets & from the laboratory results (blood & urine) of each case or control and filling the questionnaire form which was prepared to record all relevant information related to cases and controls in the study sample.

Procedure:

The questionnaire form was specially prepared in order to collect all the relevant information related to the study sample. The questionnaire form included information in regard to:

Patient sociodemographic factors, previous history of DM, previous history of HT, previous history of CVD, family history of renal diseases, GUE (general urine examination), blood Urea, serum creatinine, serum total cholesterol, eGFR (estimated GFR).

(This questionnaire information was gathered from multiple recent resources including comprehensive clinical nephrology 2015, Harrison nephrology & recent researches about CKD).

Analysis of data

Data were entered to a Word-Excel 2010 worksheet and statistical analysis of data was carried out by using Pentium five computer through the use of (SYSTAT 12) statistical software.

Results

Table 3 shows that diabetes mellitus has 12.9 risk for developing of CKD and that type 2 has 12.4 risk and more than 15 years of diabetes has 30 risks for developing of CKD.

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Table 3. Distribution of the cases and controls according to diabetes mellitus

DM	Case		Control		O.R.	P-Value	95% of C.I.
	No.	%	No.	%			
Yes	58	38.67	7	4.0	12.879	0.000	5.733 – 28.857
No	92	61.33	143	96.0			
Total	150	100	150	100			
Types of DM							
Type 1	7	12.9	1	14.29	7.294	0.032	1.150 – 45.872
Type 2	51	87.93	6	85.71	12.364	0.000	5.222– 29.187
Total	58	100	7	100			
Duration of DM							
< 10 years	9	15.52	4	57.14	2.330	0.156	0.742 – 7.292
10-15 years	24	41.38	2	28.57	14.095	0.000	3.611 – 54.726
>15 years	25	43.10	1	14.29	29.800	0.000	5.035 – 175.33
Total	58	100	7	100			

Table 4 reveals that hypertension has 3.4 risks and having hypertension for more than 15 years has 13 risks for developing of CKD.

Table 5 reveals that CVD has 13.7 risks and having more than one type of CVD has 37.25 risks for developing of CKD.

Table 6 reveals that Family history of renal disease has 7 risks and family history of CKD has 23 risks for developing of CKD.

Table 7 reveals that proteinuria has 383 risks for developing of CKD.

Table 4. Distribution of the cases and controls according to hypertension

HT	Case		Control		O.R.	P-Value	95% of C.I.
	No.	%	No.	%			
Yes	91	60.67	46	30.67	3.487	0.000	2.166 – 5.613
No	59	39.33	104	69.33			
Total	150	100	150	100			
Duration of HT							
< 10 years	39	42.85	39	85.0	1.000	1.000	0.598 – 1.671
10-15 years	40	43.96	6	13.0	8.727	0.000	3.654 – 20.783
>15 years	12	13.19	1	2.0	12.96	0.002	2.124 – 78.430
Total	91	100	46	100			

Table 5. Distribution of the cases and controls according to cardiovascular disease

CVD	Case		Control		O.R.	P-Value	95% of C.I.
	No.	%	No.	%			
Yes	48	31.33	5	3.33	13.647	0.000	5.401 – 34.370
No	102	68.67	145	96.67			
Total	150	100	150	100			
Types of CVD							
IHD	11	22.9	3	60.0	3.878	0.029	1.136 – 13.167
HF	7	14.5	1	20.0	7.294	0.032	1.150 – 45.872
>one type	30	62.5	1	20.0	37.25	0.000	6.323 – 218.22
Total	48	100	46	100			

Table 6. Distribution of the cases and controls according to family history of renal diseases

Family history of renal disease	Case		Control		O.R.	P-Value	95% of C.I.
	No.	%	No.	%			
Yes	43	28.67	8	4.67	7.133	0.000	3.269 – 15.527
No	107	71.33	142	95.33			
Total	150	100	150	100			
Types of Family history of renal al diseases							
Polycystic kidney disease	2	4.65	1	12.5	2.014	0.562	0.260 – 15.507
CKD	20	46.51	1	12.5	22.92	0.000	3.845 – 135.75
kidney stone	12	27.91	5	62.5	2.522	0.080	0.900 – 7.040
>one type	9	20.93	1	12.5	9.511	0.010	1.530 – 58.617
Total	43	100	8	100			

Table 7. Distribution of the cases and controls according to proteinuria

Family history of renal disease	Case		Control		O.R.	P-Value	95% of C.I.
	No.	%	No.	%			
Yes	108	72.0	1	0.67	383.143	0.000	65.202 – 2231.9
No	42	28.0	149	99.33			
Total	150	100	150	100			

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Figure 2 shows that the highest rates of the risk factors of CKD, which had statistically significant association for the developing of CKD were: proteinuria (72%) (P=0.000), family history of chronic diseases (68%) (P=0.000), hypertension (60.67%) (P=0.002), urinary cast (61.33%) (P=0.000), pyuria (58.67%) (P=0.000), cigarettes smoking (50%) (P=0.000), dyslipidemia (46 %) (P=0.000) and showed that hematuria, recurrent pyelonephritis and illiterate had (43.30%) (P=0.000) and for DM (38.7%) (P=0.000) and for Nephrotoxic drugs and agents (34.67%) (P=0.000).

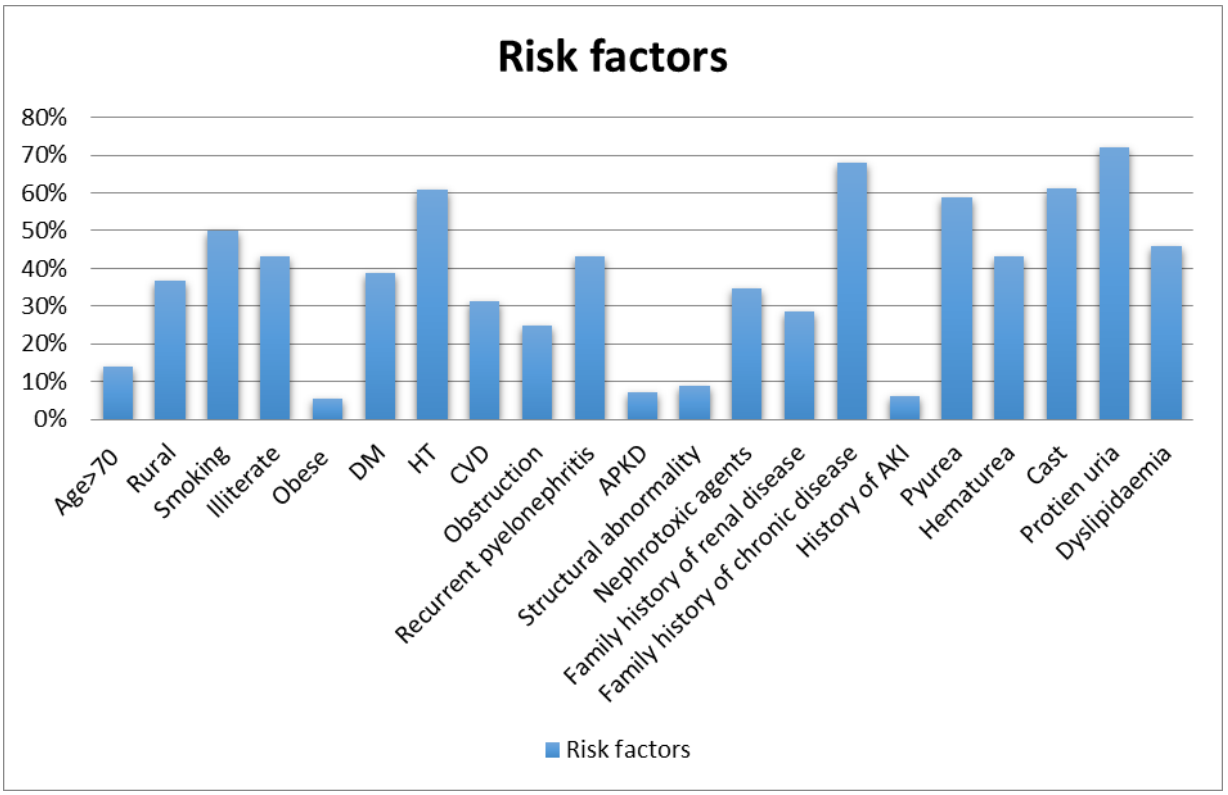

Figure 2. Distributions of the rates of the risk factors of CKD in the case group

Discussion

From this study it has been revealed that diabetes has 38.67% of the adult cases with CKD. Nevertheless, 20-40% of diabetics will develop diabetic nephropathy during the end stage of their disease; therefore, with the increase of cases of diabetic patients, the incidence of CKD is expected to rise. This result was similar to the result of the study done in 2003 (and to the result in the study by Remuzzi et al in 2012 [6]. Hypertension is very common in patients with CKD, and the level of blood pressure is associated with the rate of loss of kidney function. Control of blood pressure slows the rate of decline of kidney function. This result was similar to the result of the study in 2016 [7]. The presence of CVD like IHD (ischemic heart disease) and HF (heart failure) is independently associated with kidney function decline, increased risks of serum creatinine elevation, eGFR decline and development of CKD. This result was similar to the result of a study in united states in 2005 [8]. Family history of CKD/ESRD has been considered a significant risk factor for CKD. Genetic predisposition plays a key role in many forms of CKD. This result was similar to the result of the study done in Beijing 2008 [9]. Proteinuria is the strongest single predictor of GFR decline. Therapies that decrease proteinuria generally slow GFR

decline. Proteinuria-induced glomerular and renal tubular injury is a key mechanism of natural progression. The threshold for natural progression attributable to proteinuria appears to be crossed when proteinuria exceeds 500 mg/day. Proteinuria magnitude is the strongest single risk factor CKD progression. This result was similar to the result of a study in 2003 [5].

This study concluded that there are many risk factors significantly contributing to the development of CKD in Mosul especially diabetes mellitus, hypertension, family history of renal disease, from this study it has been also concluded that proteinuria plays a major role for the development and progression of CKD. Application of further prevention and control are highly recommended to reduce the burden of CKD.

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Author contribution

Dr. Khaleel: collection of data, statistics and conclusion. Dr. Hussain: helped in the collection of data. Dr. Hmood: helped by giving clinical notes in collecting the data of the study.

Conflict of interest

There is financial conflict in doing the investigation for the study and collecting of data.

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