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Clinical and laboratory characteristics of adults with chronic kidney disease in Jos, Nigeria

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Abstract

Background:

Chronic kidney disease (CKD) affects between 10 to 16% of the population globally. In

Nigerians, it is the most common mode of presentation of patients with renal disease. We

describe the clinical and laboratory characteristics of adults diagnosed with CKD at the Jos

University Teaching Hospital (JUTH). Identifying these characteristics would help create more awareness among health workers on the nature of CKD in our setting.

Methods:

This was a descriptive retrospective study on 81 patients aged 16-88 years, in which patients' data were extracted from their case notes over a period of 3 years (January 2008 to December 2010). The median and interquartile range (IQR) for continuous variables and the frequency and percentages of CKD across categorical variables, were determined

Results: The median age of the patients was 38 years (IQR, 29 - 50) and majority were males (49, 60.5%). The median eGFR of the patients was low, 12 mls/min/1.73m^2 (IQR, 7 -25). Majority were ≤40years of age (45, 55.6%) and had stage 2 systolic hypertension (40/81, 49.4%) and stage 2 diastolic hypertension (49/81, 60.5%), a diagnosis of chronic glomerulonephritis (35/81, 43.2%), anaemia (PCV<24%) (59/75,78.7%), urea level >6.5 mmol/L (70/79, 88.6%), serum creatinine level >126.0 µmol/L (69/75, 92%), uric acid level >420 µmol/L (33/45, 73.3%) and proteinuria (53/71, 74.7%).

Conclusion: CKD was commoner in young adults. The majority of patients had very low eGFR with anaemia as the commonest complication; suggesting late presentation. There is therefore the need for education of health workers on the importance of early and timely referral of CKD patients to nephrologists. A thorough evaluation of CKD patients, early detection and treatment of complications associated with advanced CKD should also be emphasized.

Introduction

Chronic kidney disease (CKD) affects between 10 to 16% of the population globally.[1] In Africa, the lack of renal registries means that there are no reliable statistics about the prevalence of CKD in most African countries; few studies have however estimated the incidence to be less

than 100 per million population. [2, 3] In most African countries, CKD mainly affects the young aged between 20 to 50 years. CKD affects between 1.6 to 12.4% of Nigerians and is the most common mode of presentation of patients with renal disease. [4, 5, 6]

Various factors have been found to cause CKD, the most common of such factors in sub Saharan Africa (SSA) include: hypertension (HTN), infection related-chronic glomerulonephritis (CGN), diabetes mellitus (DM), and human immunodeficiency virus infection (HIV) [2, 7]. Of these factors, HTN is one of the most important. Hypertension has been shown to have a strong, graded association with CKD, especially in men [8].

We describe the clinical and laboratory characteristics of adults diagnosed with CKD at the Jos University Teaching Hospital. Identifying such characteristics could help create more awareness among health workers on the nature of CKD in our setting.

Methods

Study design

This was a descriptive retrospective study in which patient data was extracted from their case notes over a period of 3 years from January 2008 to December 2010

Study subjects

These were adults aged 16 – 88 years diagnosed with CKD at JUTH during the period of the study. In this study CKD was defined as kidney damage or decreased glomerular filtration rate (GFR) of less than 60ml/min/1.73m^2. [1]

Study site

The study was undertaken in the medical out-patient clinic and medical wards at JUTH, Jos, Nigeria.

Clinical and Laboratory methods

The blood pressure (BP) of patients was measured on two different occasions using a mercury sphygmomanometer in the sitting position, with the patient calm. The average of two readings was taken as the BP. Blood pressure was classified based on the JNC 7 classification [9]. The body mass index (BMI) of each patient was calculated from their height and weight using the formula: Weight (kg)/ Height (M^2).

Abdominal ultrasound scan (USS) was used to determine kidney size, echogenicity and cortico-medullary differentiation (CMD) and the presence of any kidney cysts. Calyceal, ureteric and bladder dilatations were also determined using USS. Blood glucose level was determined using glucose oxidase method [10]. Blood lipids (serum cholesterol, high density lipoprotein, low density lipoprotein and triglyceride), uric acid and serum creatinine were measured using an C 311 chemistry autoanalyzer (Roche Diagnostics, Mannheim, Germany). The presence of protein and blood in urine was determined using Combi-10 Urinalysis strips. While haemoglobin (Hb) and packed cell volume (PCV) levels were measured using the Mindray BC-3200 haematology autoanalyser (Roche Diagnostics, Mannheim, Germany). The estimated glomerular filtration rate (eGFR) was calculated using the modification of diet in renal disease (MDRD) formula [11]. All the clinical, radiological and laboratory values were obtained at the point of diagnosis of CKD.

Ethical Consideration.

Ethical approval for the study was obtained from the research and ethics Committee of JUTH.

Statistical analysis

Data analysis was performed using Stata software version 10.0 (Stata Corporation, College Station, Texas, USA). The median and interquartile range (IQR) was determined for all continuous variables as these were not normally distributed. The body mass index (BMI) was calculated using Stata by the formula: Weight (kg)/ Height (M^2). The continuous variables (FBS, BP, Hb, PCV, eGFR, BMI, cholesterol, creatinine, urea and uric acid levels) were also categorized into categorical variables using appropriate cut off points as follows: FBS $\geq$6.5 mmol/L as DM, Systolic $\geq$140 mmHg and Diastolic $\geq$90 mmHg as HTN, PCV<36% (Hb <12 g/dL) in females or PCV <39% (Hb <13 g/dL) in Males as anaemia in patients with CKD[12], eGFR <60 ml/min/1.73m^2 as evidence of CKD, BMI (18.5-24.9, 25.0-29.9, and $\geq$30 kg/m^2 which is considered as obesity),

cholesterol >6.5 mmol/L as hypercholestrolaemia, while creatinine ≥126 µmol/L, urea >6.5 mmol/L and uric acid >420 µmol/L indicate elevated levels. The frequency and percentages of CKD across the various categorical variables were determined. Patients with missing data were excluded from the analysis.

Results

There were a total of 81 adult patients with CKD. Their median age was 38 years (IQR, 29 - 50) and majority were males (49, 60.5%), the Male: Female ratio being 1.5. The median duration of illness at the time of presentation was 1 month (IQR, 0.5 - 12). Their median systolic BP was high, 150 mmHg (IQR, 140 - 180) and so was their diastolic BP, 110 mmHg (90-110). Their mean BMI was within normal limits, 22.5 kg/m^2 (IQR, 20.8-26.5). The patients had a high median serum creatinine, urea and uric acid levels: 503 µmol/L (IQR, 236 - 903), 20.6 mmol/L (IQR, 10.8 - 33.1) and 530 µmol/L (419 - 637), respectively. The median eGFR of the patients was very low, 12 mls/min/1.73m^2 (IQR, 7 -25) and median Hb was also low, 9.8 g/dL (IQR, 7.7-12) while their median FBS, PCV and serum cholesterol were within normal limits: 5.2 mmol/L (IQR, 4.8 - 6.5), 31% (25 - 36), 5.4 mmol/L (4.6-6.1), respectively (Table 1).

Table 1. Clinical and laboratory characteristics of adults with chronic kidney disease at the Jos University Teaching Hospital, Jos

Characteristic	N (%)*
Age (years)	
≤40	45 (55.6)
>40	36 (44.4)
Median (IQR)	38 (29-50)
Missing**	0 (0.0)
Sex	
Female	32 (39.5)
Male	49 (60.5)
Missing	0 (0.0)
Duration of illness at presentation (months)	
Median (IQR)	1 (0.5-12)
Missing	8 (9.9)
Accompanying diagnosis	
Glomerulonephritis	35(43.2)

Hypertension	26 (32.2)
Diabetes mellitus	10 (12.4)
Autosomal dominant polycystic kidney disease	6 (7.4)
Acute renal failure	1 (1.2)
Obstructive uropathy	1 (1.2)
Nephrotic syndrome	1 (1.2)
Posterior uretral valve	1 (1.2)
Missing	0 (0.0)
Systolic blood pressure (mmHg)	
<140	17 (21.0)
≥140	64 (79.0)
Median (IQR)	150 (140-180)
Missing	0 (0.0)
Diastolic blood pressure (mmHg)	
<90	18 (22.2)
≥90	63 (77.8)
Median (IQR)	100 (90-110)
Missing	0 (0.0)
Body mass index (kg/m^2)	
<18.5 (Underweight)	0 (0.0)
18.5-24.9	15 (62.5)
25.0-29.9	7 (29.2)
≥30 (Obesity)	2 (8.3)
Median (IQR)	22.5 (20.8-26.5)
Missing	57 (70.4)
Packed cell volume† (%)	
≥36 or ≥39	18 (24.0)
<36or <39 (Anaemia)	57 (76.0)

Median (IQR)	31 (25-36)
Missing	6 (7.4)
Haemoglobin (g/dL)	
≥12 or ≥13	11 (22.4)
<12 or 13 (Anaemia)	38 (77.5)
Median (IQR)	9.8 (7.7-12)
Missing	32 (39.5)
Fasting blood glucose (mmol/L)	
<6.5	27 (75.0)
≥6.5	9 (25)
Median (IQR)	5.3 (4.9-6.4)
Missing	45 (55.5)
Serum cholesterol (mmol/L)	
≤6.5	48 (78.7)
>6.5	13 (21.3)
Median (IQR)	5.4 (3.7-6.4)
Missing	20 (24.7)
Estimated glomerular filtration rate (mls/minute)	
≥60	6 (7.5)
<60	74 (92.5)
Median (IQR)	12 (7-25)
Missing	1 (1.2)
Serum creatinine (µmol/L)	
≤126	6 (8.0)
>126	69 (92.0)
Median (IQR)	503 (236-903)
Missing	6 (7.4)
Serum urea (mmol/L)	

≤6.5	9 (11.4)
>6.5	70 (88.6)
Median (IQR)	20.6 (10.8-33.1)
Missing	2 (2.5)
Serum uric acid (μmol/L)	
≤420	12 (26.7)
>420	33 (73.3)
Median (IQR)	530 (419-637)
Missing	36 (44.4)
Right kidney size (cm)	
Median (IQR)	9.5 (8.6-10.8)
Missing	1 (1.2)
Left kidney size (cm)	
Median (IQR)	9.7 (8.5-10.9)
Missing	0 (0.0)
Renal echogenicity	
Normal	18 (23.4)
Increased	59 (76.6)
Missing	4 (4.9)
Increased corticomedullary differentiation	
Normal	29 (39.2)
Increased	45 (60.8)
Missing	7 (8.6)
Renal cyst	
Absent	70 (86.4)
Present	11 (13.6)
Missing	0 (0.0)

Calyceal dilatation	73 (90.1)
Absent	8 (9.9)
Present	0 (0.00
Missing	
Ureteric dilatation	
Absent	76 (98.7)
Present	1 (1.3)
Missing	4 (4.9)
Bladder dilatation	
Absent	77 (100)
Present	0 (0.00)
Missing	4 (4.9)
Urinary protein	
Absent	18 (25.3)
Present	53 (74.7)
Missing	10 (12.3)
Blood in urine	
Absent	53(81.5)
Present	12 (18.5)
Missing	16 (19.8)

*Data are presented as No. (%) or median (interquartile range).
**Missing values for each variable shown are the number (%) out of a total of 81 patients
†Anaemia was defined as PCV<36% (Hb <12 g/dL) in females or PCV <39% (Hb <13 g/dL) in Males

Majority of the patients were ≤40years of age (45, 55.6%) and had: systolic BP ≥140 mmHg (64/81, 79.0%), diastolic BP ≥90 mmHg (63/81, 77.8%), an eGFR of <60 ml/minute (74/81, 92.5%), a diagnosis of chronic glomerulonephritis (CGN) (35/81, 43.2%), a normal FBS level (27/36, 75.0%), anaemia (PCV<36% or 39%) (57/75, 76%), increased renal echogenicity (59/77, 76.2%), a poor renal CMD (45/74, 60.8%), urea level >6.5 mmol/L (70/79, 88.6%), serum creatinine level >126.0 µmol/L (69/75, 92%), uric acid level >420 µmol/L (33/45, 73.3%) and proteinuria (53/71, 74.7%). Also, majority of the patients did not have: haematuria (53/65, 81.5%), hypercholesterolaemia (48/, 78.7%), calyceal dilatation (73/81, 90.1%), ureteric dilatation

(76/77, 98.7%), bladder dilatation (77/77, 100%). Only 2 patients (8.3%) had obesity.
Based on the JCN 7 classification of BP, majority of the patients with CKD had a stage 2 systolic hypertension (40/81, 49.4%) and stage 2 diastolic hypertension (49/81, 60.5%) (Table 2).

Table 2. Blood pressure levels in adults with chronic kidney disease at the Jos University Teaching Hospital, Jos

Blood pressure classification*	Total N (%)
Normal	
SBP (<120 mmHg)	7 (8.6)
DBP (<80 mmHg)	8 (9.9)
Prehypertension	
SBP (120-139 mmHg)	10 (12.3)
DBP (80-89 mmHg)	10 (12.3)
Stage 1 hypertension	
SBP (140-159 mmHg)	24 (29.6)
DBP (90-99 mmHg)	14 (17.3)
Stage 2 hypertension	
SBP (≥160 mmHg)	40 (49.4)
DBP(≥100 mmHg)	49 (60.5)

*Classification was based on the JCN 7 classification of BP
SBP = Systolic blood pressure. DBP = Diastolic blood pressure. mmHg = Millimeters of mercury

Discussion
Majority of the CKD patients seen were young, had chronic glomerulonephritis as the underlying cause of their CKD, stage 2 hypertension, anaema and a reduced eGFR with an accompanying elevation of serum urea, creatinine and uric acid levels.
The finding that CKD was commoner in young adults in their economically productive years is consistent with previous studies in SSA. This is at variance with the finding in developed countries where CKD is commoner among middle aged and elderly people [2,7] . Hypertension, which was found in majority of our patients, is one of the leading risk factors for the development of CKD in SSA. There is a strong association between CKD and hypertension where each can cause or aggravate the other, thus the control of elevated blood pressure is important in all stages of CKD regardless of aetiology [2,7,13]. Majority of the patients had BMI that was normal with only 2 (8.3%) having BMI ≥30 kg/m^2 (obesity) and this may be because about 57/81 had missing values for BMI. Obesity and underweight has been established as a contributing factor for the increased morbidity and mortality in patients with advanced CKD [14].

Most of our patients had advanced CKD with low eGFR; this could be an indication of late referral to a nephrologist, a situation similar to other previous studies in Nigeria [15,16,17]. Late referral is known to be associated with higher mortality in CKD [18]. Anaemia was common among our patients, similar to the finding by Shittu et al [19]. Anaemia contributes to the acute deterioration in patients with CKD. Also, anaemia contributes significantly to the increased mortality among CKD patients, and

supports the late presentation among our patients[12].

One of the limitations of this study, which used data that was retrospectively collected, was that some variables had missing values, which has resulted in the underestimation of the frequency (proportion) of certain patient characteristics.

Conclusion

In our experience, CKD occured more in young adults who presented late with advanced CKD and attendant complications like anaemia. We recommend more education of other health workers on the need for early referral of CKD patients to the Nephrologists for appropriate management. The need for thorough evaluation of CKD patients, early detection and treatment of complications associated with advanced CKD cannot be overemphasized.

Conflict of Interest: None

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