# THE AETIOLOGY OF CHRONIC KIDNEY DIEASE IN MAIDUGURI, NIGERIA

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**ABSTRACT**

**Background:** Chronic kidney disease (CKD) is a growing health problem worldwide.

**Objectives:** To determine the aetiology of chronic kidney disease among haemodialysis requiring patients in the University of Maiduguri Teaching Hospital, Nigeria.

**Methods:** A cross-sectional study of one hundred consecutive patients with stage 5 chronic kidney failure requiring haemodialysis at the university of Maiduguri teaching Hospital between January and December 2005. Their demographic data, clinical features, aetiology of the CKD, and laboratory data were recorded using a questionnaire administered by the investigators.

**Results:** There were 68 males (68%) and 32 females (32%) with most of the patients (55%) in their 3rd and 4th decades of life. Majority (21%) were from Maiduguri metropolis. Fifteen (15%) of the study population came from Gashua, a town in the northern part of Yobe State. Gashua town has a CKD prevalence rate of 10.7/100,000 accounting to 45% of cases from Yobe State, the highest among the 17 Local Government Areas of the state.

The aetiology of CKD was hypertension in 55%, chronic glomerulonephritis in 28%, and diabetes mellitus in 12% of the study population, but in 4% of the cases, the cause of CKD could not be ascertained, thus regarded as unclassified.

**Conclusion:** Hypertension and GN were the commonest causes of CKD in this environment. Gashua town of Yobe State has a very high CKD prevalence rate. The reasons for this need to be investigated.

## INTRODUCTION

The number of chronic kidney failure patients sustained by haemodialysis has been on the increase in Maiduguri perhaps due to the availability and increased awareness of renal replacement therapy by the people.

Chronic kidney disease (CKD) is a growing health problem worldwide. Several published studies emphasize that CKD is under diagnosed and undertreated.[1-3] The public health and economic burdens of CKD continue to increase at an alarming rate with the incidence of End Stage Renal Disease (ERSD) estimated to be 7% and prevalent population of 1.1 million that is expected to top 2 million by 2010.[5] It has been projected that the cost of renal replacement therapy will soon exceed 1 trillion dollars per annum globally at a patient per capital cost of over $55,000 in the US.[5] The majority of ERSD patients receiving dialysis or transplantation reside in the rich industrialized countries whereas in developing countries like India despite the cheaper cost of haemodialysis, that modality of treatment is largely unsustainable because of rampant poverty.[5] Despite the high burden and associated high morbidity, the causes of CKD in a high percentage of individuals remain largely elusive[6] especially in developing countries where lack of modern diagnostic techniques and late presentation to nephrologists greatly limit the characterisation of kidney diseases. These limitations have probably led to the misclassification of significant number of patients with the findings of bilaterally contracted kidneys as chronic glomerulonephritis. Therefore, recognition of this chronic condition is crucial to facilitate the employment of measures that can slow progression to end-stage renal disease (ESRD).[6] Also, appropriate and timely

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interventions in patients with CKD would enhance therapy of co-morbid conditions, reduce associated complications, and improve patient outcomes.[9] This study was therefore aimed at determining the causes of chronic kidney disease among our haemodialysis requiring patients.

## MATERIALS AND METHODS

### Study Area

This study was carried out at the University of Maiduguri Teaching Hospital (UMTH), Maiduguri, Nigeria. Maiduguri is the capital of Borno state in north-eastern Nigeria with a population of about 0.7 million. It lies between latitude 11.5°N and 13.5°N in the Sudan savannah.

### Study Design/Subjects

This was a cross-sectional study carried out between January and December 2005. One hundred consecutive patients with stage 5 chronic kidney failure attending the nephrology clinic or admitted into the medical wards of the University of Maiduguri Teaching Hospital were recruited for the study. Patient's demographic data were recorded on a questionnaire administered by the investigators. Other parameters recorded include clinical features, aetiology of the CKD, and laboratory data.

### Patient Evaluation

Detailed history of the patients' clinical condition was taken. Patients were subsequently examined. Blood samples were obtained at entry for creatinine clearance, serum electrolytes including calcium and phosphate, urea and creatinine, liver function tests, HIV screening, HCV abs, HbsAg and full blood count (FBC). Estimated glomerular filtration rate (eGFR) was obtained by calculation using Cockroft and Gault equation.[10] Abdominal ultrasound scan was also done on all those recruited for the study.

Those with previous history of AGN, streptococcal sore throat, streptococcal skin infection, elevated ASO titre, or haematuria following throat or skin infection were considered to have CGN if presented with bilaterally shrunken kidneys and do not have evidences of other organ involvement of hypertension or diabetes. Long standing hypertension or diabetes mellitus with renal involvement particularly with evidence of other end organ damage formed the criteria for the diagnosis of hypertensive nephropathy and diabetic nephropathy respectively. Additionally the findings of normal sized

kidneys bilaterally in diabetic patients with nephropathy strengthen our suspicion of diabetic nephropathy. Diagnosis of polycystic kidney disease, medullary sponge kidneys, obstructive uropathy were based on documented clinical and radiologic criteria.[11-13] Those patients whose cause of CKD could not be established after thorough evaluations were regarded as unclassified.

## RESULTS

One hundred consecutive kidney failure patients made up of 68 males (68%) and 32 females (32%) were enrolled into the study. Most of the patients (53%) were in their 3rd and 4th decades of life. Their ages ranged between 15 and 74 years with a mean ± SD of 39.9 ± 13.58 years. The mean ± SD age of the male patients was 41.71 ± 13.27 years and that of female patients was 36.06 ± 13.64 years (Table 1).

Majority of the study population (21%) were from Maiduguri metropolis, which is a cosmopolitan town with a population of 0.7 million. Fifteen (15%) of the study population came from Gashua, a town in the northern part of Yobe State, 10 (10%) from Kanuri dominated villages of northern Borno, 9 (9%) from Yola and other towns around it, 7 (7%) from Biu and surrounding villages, while 6 (6%) each were from Nguru and Potiskum, and 5 (5%) each from Damaturu, Hong, Kaltungo and Katagum, respectively. There were 3, 2 and 1 patients each from Michika, Wukari and Bama, respectively. This was illustrated in Table 2.

We projected in this hospital study an estimate of the population prevalence per 100,000 that Gashua town has a prevalence rate of 10.7/100,000, Yobe state 1.68/100,000, Borno state 0.87/100,000, Adamawa 0.42/100,000, Gombe 0.17/100,000, Taraba 0.12/100,000 and Bauchi 0.10/100,000. Those from Gashua accounts for 45% of patients from Yobe State (Table 3).

The aetiology of the CKD was hypertension in 35% of the patients, CGN in 28% and diabetes mellitus in 12%. Pyelonephritis 4%, polycystic kidney disease 3%, analgesic and toxic nephropathy 3%, Alport's syndrome and obstructive uropathy accounted for 2% each, while sickle cell nephropathy and medullary sponge kidneys accounted for 1%, (Table 4). Nine percent of the study patients had CKD of uncertain cause in this study because we could not pinpoint any cause of kidney failure in them.

Normal kidney sizes was detected on ultrasound scan in all the patients with diabetic nephropathy, pyelonephritis, ADPKD, sickle cell nephropathy, medullary sponge kidneys, and 1 of 3 patients with

analgesic and toxic nephropathy. All patients with hypertensive nephropathy, CGN, Alport syndrome, obstructive nephropathy, kidney disease of unknown etiology, and 2 patients with analgesic and toxic nephropathies had shrunken kidneys. (Table 5).

There is increased cortical echogenicity with corticomedullary differentiation ranging from poor to complete loss in the study group, except in patients with ADPKD where the corticomedullary picture could not be

**Table 1. Age and sex distribution of study patients**

| Age (yrs) | Sex | | Total n (%) |
|---|---|---|---|
| | Male n (%) | Female n (%) | |
| ≤19 | 3 (3%) | 3 (3%) | 6 (6%) |
| 20-29 | 9 (9%) | 8 (8%) | 17 (17%) |
| 30-39 | 17 (17%) | 7 (7%) | 24 (24%) |
| 40-49 | 20 (20%) | 9 (9%) | 29 (29%) |
| 50-59 | 11 (11%) | 3 (3%) | 14 (14%) |
| 60-69 | 6 (6%) | 2 (2%) | 8 (8%) |
| ≥70 | 2 (2%) | 0 (0%) | 2 (2%) |
| Total | 68 (68%) | 32 (32%) | 100 (100%) |

**Table 2. Geographical location of study patients**

| Geographical location of study patients | Frequency (n) | Percentage (%) |
|---|---|---|
| Maiduguri | 21 | 21 |
| Gashua | 15 | 15 |
| Kanuri villages | 10 | 10 |
| Yola and villages | 9 | 9 |
| Biu and surrounding Villages | 7 | 7 |
| Nguru | 6 | 6 |
| Potiskum | 6 | 6 |
| Damaturu | 5 | 5 |
| Hong | 5 | 5 |
| Kaltungo | 5 | 5 |
| Katagum | 5 | 5 |
| Michika | 3 | 3 |
| Wukari | 2 | 2 |
| Bama | 1 | 1 |
| Total | 100 | 100 |

**Table 3. Cases per 100,000 populations according to geographical location**

| States | Cases (n) | Cases (%) | Cases/100,000 Population |
|---|---|---|---|
| Borno | 39 | 39% | 0.87* |
| Yobe | 32 | 32% | 1.68** |
| Adamawa | 17 | 17% | 0.42 |
| Gombe | 5 | 5% | 0.17 |
| Bauchi | 5 | 5% | 0.10 |
| Taraba | 2 | 2% | 0.12 |
| Total | 100 | 100% | |
| Gashua | 15 | 15% of total patients 45% of Yobe state patients are from Gashua | 10.7*** |

*High prevalence rate

**Very high prevalence rate

***Extremely high prevalence rate

**Table 4. Aetiologies of CKD in the study population**

| Aetiology of CKD | Frequency (n) | Percentage (%) |
|---|---|---|
| Hypertension | 35 | 35 |
| CGN | 28 | 28 |
| Diabetes mellitus | 12 | 12 |
| Pyelonephritis | 4 | 4 |
| Polycystic kidney disease | 3 | 3 |
| Analgesics and toxins | 3 | 3 |
| Alport syndrome | 2 | 2 |
| Obstructive uropathy | 2 | 2 |
| Sickle cell disease | 1 | 1 |
| Medullary sponge kidneys | 1 | 1 |
| Unclassified | 9 | 9 |
| Total | 100 | 100 |

**Table 5. Kidney sizes and corticomedullary picture of study population**

| Etiology of CKD | Kidney sizes | | Corticomedullary dif | |
|---|---|---|---|---|
| | Normal(n) | Shrunken(n) | Poor(n) | Lost(n) |
| Hypertension | 0 | 35 | 29 | 6 |
| CGN | 0 | 28 | 18 | 10 |
| Diabetes mellitus | 12 | 0 | 11 | 1 |
| Pyelonephritis | 4 | 0 | 4 | 0 |
| Polycystic kidney Disease | 3 | 0 | - | - |
| Analgesics and Toxins | 1 | 2 | 2 | 1 |
| Obstructive uropathy | 0 | 2 | 1 | 1 |
| Alport syndrome | 0 | 2 | 2 | 0 |
| Sickle cell disease | 1 | 0 | 1 | 1 |
| Medullary sponge Kidneys | 1 | 0 | 1 | 0 |
| Unknown | 0 | 9 | 0 | 9 |

properly assessed because of multiple renal cysts (Table 5).

## DISCUSSION

We found hypertension and CGN to be the commonest causes of CKD in our study population. This is in agreement with findings of Akinsola et al,[14] Ojogwu et al,[15] and Kadiri et al[16] at Ile-Ife, Benin and Ibadan respectively. Diabetes mellitus, which is the commonest cause of CKD in Europe and America, [17, 18] was the found to be the distant third commonest cause of CKD in this study. Other aetiologies of CKD in this study are pyelonephritis, polycystic kidney disease, analgesics and toxins, Alport syndrome, obstructive uropathy, sickle cell disease and Medullary sponge kidney.

Ojogwu *et al* did a prospective study of 1,980 patients with ESRD over a six year period. Using information derived from intravenous pyelogram, ultrasonography, renal biopsies and autopsies, they found out that 43% of cases of chronic renal failure were due to hypertensive nephrosclerosis.

Several factors could have been responsible for the finding of hypertension as the commonest cause of CKD in Nigeria. One such factor is the fact that high blood pressure is a major health problem in Blacks, with a prevalence of 33% in Afro-Caribbean in America.[19] Secondly, the development of renal failure is twenty times more likely in Black hypertensives aged 40-44yrs than in Whites.[19]

The high prevalence of CKD among residents of Gashua is a finding which needs to be further looked into. All those we termed unclassified are residents of Gashua town.

## LIMITATIONS OF THE STUDY

1. Individuals recruited into the study were all haemodialysis requiring CKD patients because that was the common presentation in our centre.

2. Although only a few of the patients fulfill the criteria for renal biopsy, none had one done.

## CONCLUSIONS AND RECOMMENDATION

The commonest cause of CKD in this study is hypertension. Demographically, most of the patients we see with CKD in this study are in their productive age group. Gashua town of Yobe State has the highest CKD prevalence rate in this study.

Public enlightenment campaign and awareness creation on hypertension and its sequellae should be embarked upon by Nephrologists in Nigeria. Optimal management of hypertension is a key to successful prevention of end organ damages of hypertension. The cause of the high CKD prevalence rate in Gashua town

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