Chronic kidney disease in children as seen in a tertiary hospital in Enugu, South-East, Nigeria

OI Odetunde, HU Okafor, SN Uwaezuoke, BU Ezeonwu, KD Adiele, OM Ukoha

Department of Paediatrics, Paediatric Nephrology Unit, University of Nigeria Teaching Hospital, Enugu, Nigeria

Abstract

Background: The prevalence of chronic kidney disease (CKD) in children has been reported to be rising locally and globally. There is a dearth of data and inadequate facilities for the management of CKD in children in most of the developing countries like Nigeria.

Objectives: The objective of this study is to ascertain the prevalence of CKD among children seen at University of Nigeria Teaching Hospital (UNTH), Enugu, South-East Nigeria and also to determine the stage of CKD at presentation, possible etiology, treatment options offered and the outcome.

Materials and Methods: A retrospective review of pediatric ward admissions in UNTH over a 5 year period (July, 2007 to June, 2012) was done. Information, including the age at presentation, symptoms, level of renal function, management and outcome, were obtained from the medical case notes.

Results: There were 3002 pediatric admissions within the period of review, of which 98 (3.3%) had CKD, giving incidence of 3.0 new cases per million-child population per year and the prevalence of 14.9 per million children population. Majority (54.1%) of those with CKD were over 10 years of age. Edema, oliguria and hypertension were the most frequent clinical features. The most common etiology was glomerular disease (63.6%) and 44.9% presented in CKD stage 4 and 5. Renal replacement therapy (RRT) was offered to 25 (25.5%) of the patients; 6 (24%) of whom had hemodialysis and 3 (12%) had acute peritoneal dialysis while 16 (64%) were managed conservatively. None of the patients had chronic or adequate dialysis. The overall outcome showed that 8 (8.2%) died while on admission, 15 (15.3%) left against medical advice (discharge against medical advice) because of financial constraints and could not access the therapy, 25 (25.5%) were discharged on conservative management and lost to follow-up while another 50 (51.0%) were discharged and still on follow-up.

Conclusion: CKD in children poses myriad of challenges in management in our setting with late presentation of patients and limited resources being prominent. The majority of patients could not access and sustain RRT and the outcome continues to be daunting.

Key words: Children, chronic kidney disease, Enugu, Nigeria, prevalence

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Introduction

There is limited epidemiological information on chronic kidney disease (CKD) in the pediatric population from sub-Saharan African countries as CKD is usually asymptomatic in the early stage resulting in gross under-diagnosis and under-reporting. With the current evaluation, classification and stratification system described by the National Kidney Foundation, Kidney Disease Outcome Quality Initiative (K/DOQI) clinical practice guidelines for CKD,[1] more epidemiological data should be available from the region. K/DOQI work group defined CKD as the presence of markers of kidney damage for ≥3 months with evidence

Address for correspondence:
Dr. OI Odetunde,
Department of Paediatrics, Paediatric Nephrology Unit, University of Nigeria Teaching Hospital, Ituku Ozalla, Enugu, Nigeria.
E-mail: odetoyintola@yahoo.co.uk

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of structural and functional abnormalities of the kidney, with or without decreased glomerular filtration rate (GFR) that is manifested by either pathological abnormalities or other markers of kidney damage, including abnormalities in the blood, urine or in imaging tests or GFR <60 mls/min/1.73 m^2 for ≥3 months, with or without kidney damage.[1,2] Although, the prevalence of CKD in children has been reported to be rising locally[3-5] and globally[6-13] with a steady annual increase rate of 8%,[5] there is a dearth of data and facilities for treatment is still not readily available in our environment.[3,4] With the paucity of data on CKD in the pediatric population in the region, the condition may not be considered a priority for interventions. This paper aims to provide data, which will inform health policies that may be beneficial to this group of patients.

Materials and Methods

Study site

This study was carried out at the pediatric ward, University of Nigeria Teaching Hospital (UNTH) and Enugu. The hospital is among the first generation tertiary hospital facilities with multidisciplinary clinic. The Pediatric Nephrology clinic of UNTH services to patients from the catchment area predominantly from the South-Eastern regions of Nigeria that has estimated a combined population of 16 million (16, 395, 552) and children constitute 40% of the population.[14] Ethical approval was sought from Health Research and Ethics Committee of UNTH, Enugu before commencing the study.

Methods

A retrospective review of pediatric ward admissions over a period of 5 years from July 2007 (when the hospital moved from the old site to the permanent site) to June 2012 was carried out. Admitted patients who had any of the K/DOQI clinical practice guideline criteria for CKD evaluation, classification and stratification for 3 months or more were considered cases of CKD such as proteinuria (on the spot urine protein ≥1+) and nephrotic range proteinuria, estimated glomerular filtration rate (eGFR using Schwartz formula) of <60 ml/min/1.73 m^2 and abnormal imaging studies.[1] The age at presentation of the CKD patient, the symptoms and duration of illness, the possible etiology, the renal function (eGFR), the management given, the outcome and follow-up, were obtained and recorded in the study proforma. Clinical diagnosis of glomerulonephritis in non-nephrotic patients was based on nephritic features of hypertension, hematuria, red blood cell cast, oliguria, proteinuria and edema. Family socio-economic class (SECS) was determined using the method recommended by Oyedeji to assign SECE to pediatric patients on hospital admission in his study.[15]

Data collected were subjected to analysis in the form of frequency and percentage using the Statistical Package for Social Scientists (SPSS) version 17.0 and results presented as tables and charts.

Results

During the 5 year period of review, 3002 children were admitted into the ward and 98 of them had CKD; 53 (54.1%) males and 45 (45.9%) females, giving a male:female ratio of 1.2:1, incidence of three new cases per million-child population per year and the prevalence of 14.9 per million children populations as presented in Table 1. At presentation, 9 (9.2%) of the children were below 5 years of age, 36 (36.7%) were aged between 5 and 10 years while 53 (54.1.0%) were 10-16 years [Figure 1]. 83 (84.7%) had edema, 41 (41.8%) had hypertension, 50 (51.0%) had oliguria, 36 (36.7%) each had anemia and easy fatigability [Figure 2]. Other features at presentation were fever, poor weight gain, convulsion and vomiting, 8 (8.2%) had a past history of ingestion of herbal medication. Duration of symptoms at initial presentation was ≤3 months in 37 (33.3%) of patients while in 61 (66.7%) patients, symptoms had lasted for more than 3 months. 73 (74.5%) of patients were from family of low SECS, 20 (20.4%) were of middle SECE and only 5 (5.1%) were of upper SECS.

Patients with CKD were predominantly in stage 4 and 5 at presentation, [Table 2]. The most common features were suggestive of glomerulonephritis as shown in Table 3. Renal replacement therapy (RRT) was offered to 25 (25.5%) of patients; 6 (24%) of the 25 patients that required RRT had hemodialysis (HD) and 3 (12%) had acute peritoneal dialysis (APD) while 16 (64%) were managed conservatively [Figure 3]. None of the patients had chronic or adequate dialysis as average sessions were, 2/week for HD and 4/day for APD for the average of 2 days. The overall outcome showed that 8 (8.2%) died while on admission, 15 (15.3%) left against medical advice (discharge against medical advice) because of financial constraint and

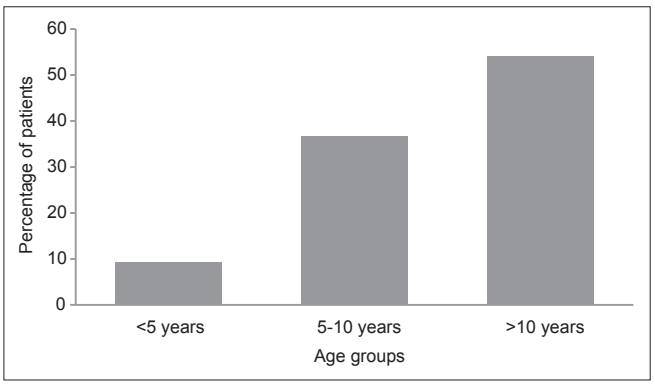

Figure 1: Age distribution of patients with chronic kidney disease

Table 1: Total pediatric admissions and prevalence of CKD

Number of patients (%)	Male	Female	Total
Number of patients in admission	1741 (58.6)	1261 (41.4)	3002 (100)
Number of patients with renal disease	92 (59.1)	62 (40.9)	154 (100)
Number of patients with CKD	53 (54.1)	45 (45.9)	98 (100)

Prevalence of 14.9 per million children populations, Admission M:F=1.4:1 CKD M:F=1.2:1, CKD=Chronic kidney disease

Table 2: Stage of CKD at initial presentation

Stage of CKD at presentation	Frequency	Percentage
Stage 1	32	32.6
Stage 2	13	13.3
Stage 3	9	9.2
Stage 4	19	19.4
Stage 5	25	25.5
Total	98	100

CKD=Chronic kidney disease

Table 3: Primary etiological diagnosis in patients with CKD

Etiology	Frequency *n*	Percentage
Glomerular disease-nephrotic syndrome (chronic nephrotic syndrome)	41	41.8
Glomerular disease-non-nephrotic (chronic glomerulonephritide)	15	15.2
CAKUT-posterior urethral valves	8	8.2
CAKUT-hypoplastic/dysplastic kidney, polycystic kidney, prune belly, others	5	5.1
Obstructive uropathy (acquired)	3	3.1
Toxic nephropathy	8	8.2
Sickle cell nephropathy	3	3.1
HIV nephropathy	2	2.0
Chronic pyelonephritis	3	4.1
Diabetic nephropathy	1	1.0
Un-identifiable	8	8.2
Total	98	100

CKD=Chronic kidney disease, HIV=Human immunodeficiency virus, CAKUT=Congenital anomalies of the kidney and urinary tract

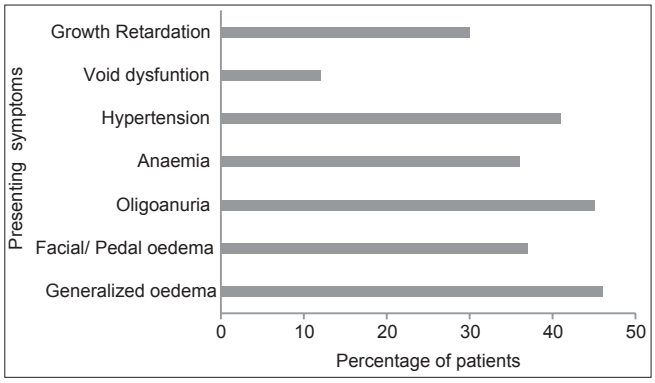

Figure 2: Distribution of symptoms at presentation

could not access the therapy, 25 (25.5%) were discharged on conservative management and lost to follow-up while another 50 (51.0%) were discharge and still on follow-up [Figure 4].

Discussion

Globally, the number of patients with CKD is increasing markedly to extent of becoming a major public health concern and may reach an epidemic level in the next decade.[8,16] The incidence of cases per million-child population differ from one country to another with 7-12 in Europe,[7,9-11] 5.7 in Chile,[12] 15 in America,[13] and 1.7-3 in Nigeria.[3,4] The prevalence of CKD in children in this study is similar to that found in Port Harcourt by Anochie and Eke[4] but higher than the report by Michael and Gabreil in Benin,[3] which documented 4/million children population in their study.[3] Although, these two studies[3,4] are hospital based like this current study, but concentrated on the later and more severe stage of renal impairment. The definition of CKD in these previous studies however was not standardized as the K/DOQI classification was not applied; hence, it becomes difficult for comparison. The high prevalence rate in this study could be due to improvement in the health-seeking behavior of the parents and increasing awareness on the importance of referral to specialty clinics on the part of the clinicians. This may be the result of awareness campaigns embarked by the unit during World Kidney Day celebrations and in other forum. Recently, the unit has experienced an increase in the number of referrals from within the hospitals catchment area. Another explanation to this rising prevalence is the liberalization of herbal intake for the treatment of ailments. The constituents of these herbs have not been critically analyzed for nephrotoxins. A study in South Africa showed increased morbidity and mortality following the use of herbal medications, from volume depletion and acute tubular necrosis.[17]

All patients had identifiable clinical features and the most common presentation was edema. This was similar to the finding by Michael and Gabreil[3] Despite the obvious clinical manifestations, patient still presented late and when they are already in kidney failure. Michael and Gabreil[3] documented similar findings. The temporary resolution of the body swelling with administration of diuretics from local patent medicine dealers and herbalists may have contributed to delay in a presentation to the nephrologists. Edema, hypertension and anemia were the prevalent presenting features as also observed in a similar study in Nigeria.[3] The frequency of hypertension among the clinical presentation of children with CKD shows the importance of holistic assessment of children during any clinic visit, for early identification of kidney disease.

There was male preponderance in the index study in consonance with another study[6] in Nigeria. Both studies were hospital based studies and only patients on admission were enrolled. A community based study may be better to

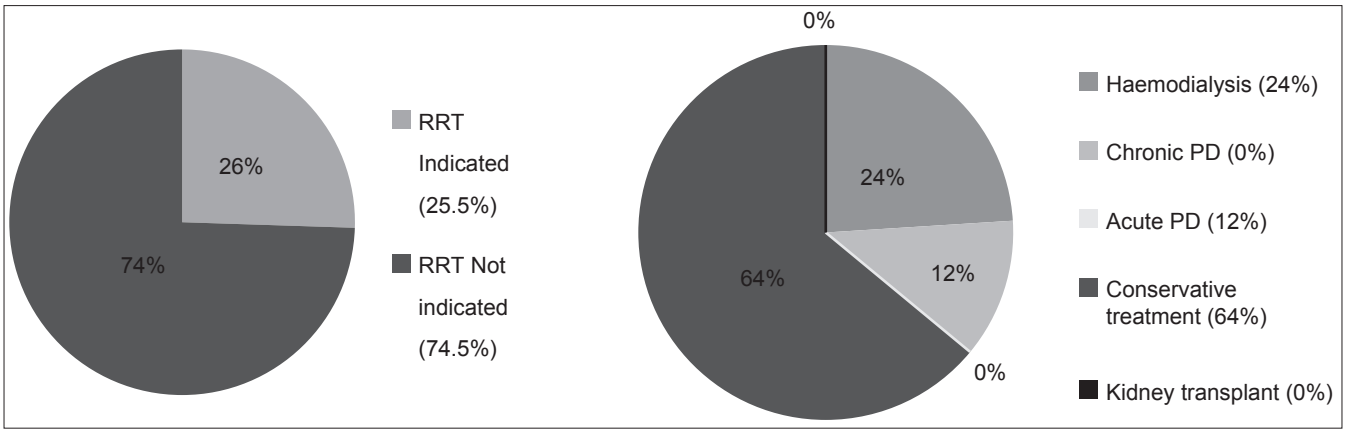

Figure 3: Renal replacement therapy indication and patients accessed to therapy

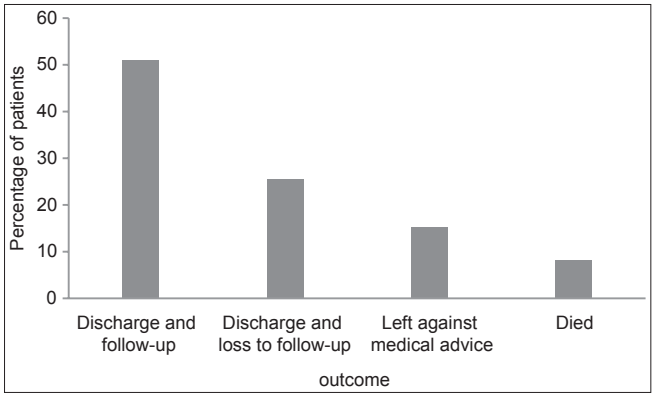

Figure 4: Outcome of patients with chronic kidney disease

assess any gender predominance.

CKD predominated in children older than 10 years reflecting the possibility of acquired etiological factors like infection related nephropathy, which has been reported by other studies from the region.[3-5,18] This is in contrast to what obtains in western countries where the prevalent cause is congenital anomalies of the kidneys.[9-13] The most common identifiable causes of CKD from this study were glomerular disease and more than 70% presented with the nephrotic syndrome. Other important causes of CKD in this study are toxic nephropathy and posterior urethral valve (PUV). Other studies at different locations in Nigeria documented the same etiology.[3-5,18,19] Patients with PUV are at risk for CKD despite surgical relief.[20,21] Simple observation of urinary stream of male neonates and infants, by mothers and pediatricians can help in reducing the risk of CKD from PUV as many will present with voiding complaints.[20] However, this has not been routinely done and as a result, cases of PUV are missed at the early stage and the resultant retrograde flow leads to progressive nephron loss and kidney failure.[20,21]

The management of CKD in children in our environment has followed the same pattern over the years. Adequate RRT has continued to be unavailable and unaffordable,[3-5,18] besides, there is no facility which offers chronic dialysis program for pediatric patients and those who started dialysis could not sustain it for long, due to the cost implication, since these services are not subsidized. Moreover, 75% of patients in this study were from the lower SECS status with abject poverty and this is an important factor contributing to the overall poor outcome in the study. This is similar to other studies from the region with increase mortality and loss to follow-up.[3-5,18]

We conclude that CKD in children apparently is on the increase and late presentation as well as failure to provide adequate management has continued to play a significant role in the overall outcome of patients. The diagnostic and interventional approach to CKD in the sub-region should emphasize more on primary prevention, early detection and aggressive slow-down of progression of the disease. We therefore recommend that identification and screening of children at risk, early referral to nephrologists and subsidization of available RRT options, should be instituted as this will help to alleviate the burden of CKD in children in the sub-region.

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