

Research Article

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## Changing Pattern of Pediatric Renal Disorders in Calabar, Nigeria

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### Introduction

Renal diseases are significant causes of morbidity and mortality in children worldwide [1]. The pattern of renal disease is similar in most parts of the world, but the frequency of the occurrence is different [2-7].

**Introduction:** The pattern of renal diseases among children is similar in most parts of the world, but with different frequencies. The pattern of renal disorders in Calabar was studied 16 years prior to the current study. This review is aimed at revealing any change in the pattern of renal disorders in Calabar 16 years after the first study.

**Materials and Methods:** This study was carried out by analyzing case notes of children admitted to the pediatric medical ward of University of Calabar Teaching Hospital, Calabar, Nigeria between January 2006 and December 2016.

**Results:** Of 8,711 children admitted during these ten years, 216 (2.5%) had renal disorders. Acute glomerulonephritis (AGN) was the commonest renal disorder observed in 64 (29.6%) cases followed by urinary tract infection (UTI) (n=60, 27.8%) and nephrotic syndrome (NS) (n=49, 22.7%). Other diseases included nephroblastoma, chronic renal failure, acute renal failure, and posterior urethra valves. Similarly, the above findings were seen in our previous study with AGN being the commonest followed by NS and then UTI. Other findings in this study, including polycystic kidney disease, renal calculi, hemolytic uremic syndrome, HIV, and sickle cell nephropathies, were not seen in the previous study. The case fatality rate was 1.9%, which was mainly due to the complications of acute nephritis.

**Conclusions:** AGN still remains the commonest renal disorder in Calabar and UTI is now the second commonest renal disease. The spectrum of renal diseases in Calabar is expanding, including polycystic kidney disease, calculi, hemolytic uremic syndrome, HIV, and sickle cell nephropathies.

**Keywords:** Changing Pattern; Renal disorders; Calabar; Children.

**Running Title:** Changing Pattern of Pediatric Renal Disorders

In Nigeria, similar patterns have been documented by many researchers with differences in the frequency of occurrence [8-18]. Acute glomerulonephritis (AGN) and nephrotic syndrome were the leading diseases in studies by Hendrickse and Gilles [8] in Ibadan, Onifade [9] in

Lagos, southwest Nigeria, Abdurrahman et al [10] in Zaria, Adedoyin et al [11] in Ilorin, Northern Nigeria, and Okoro and Okafor [12] in Enugu, south-eastern Nigeria. Urinary tract infection (UTI), nephrotic syndrome, and AGN were the leading renal disorders in studies by Michael and Gabriel [13] in Benin and Eke and Eke [14] in Port Harcourt, Southern and Ibeneme et al [17] in Umuahia, southeast Nigeria. A study in Jos by Ocheke et al [15] showed that AGN was the commonest disease followed by chronic renal failure and nephrotic syndrome, while a study by Garba et al [18] in Gusau, northwest Nigeria showed UTI, AGN and acute kidney injury (AKI) were the leading causes of renal disorder.

An earlier study was done in Calabar by Etuk et al [16] 16 years prior to this study (1991-2000). The commonest renal disorder in the study was AGN followed by nephrotic syndrome. Other diseases included urinary tract infection, obstructive uropathy, acute and chronic renal failures, and nephroblastoma. Fatality was largely caused by chronic and acute renal failure [16]. Hence, preventive nephrology should be encouraged in our resource-poor setting where dialysis and renal transplantation are not readily available.

This current review study was conducted to reveal any change in the pattern of renal disorders in Calabar 16 years after the first survey. This would help us expand our scope of management of these disorders, thereby preventing progression to chronic renal disease.

### Materials and Methods

This study was carried out in the Nephrology Unit, Department of Pediatrics, University of Calabar Teaching Hospital (UCTH), Calabar. UCTH is located about 5 kilometers from the center of Calabar, the capital of Cross River State in the South-south geopolitical zone of Nigeria. It is the only referral center in the state and also subserves the neighboring states of Akwalbom and Benue.

The case folders of all children with renal diseases admitted to the children's ward of UCTH from January 2006 to December 2016 were reviewed. Information was extracted into a proforma questionnaire including age, sex, occupation and educational status of parents, duration of illness before presentation to the hospital, clinical presentation, hospital diagnosis, investigation results, treatment, duration of hospital stay, and outcome. Moreover, total admission within the period was noted.

Investigations included complete blood count, urinalysis, urine microscopy, culture and sensitivity, serum urea, electrolytes and creatinine, genotyping, and malaria parasite. Other tests were done depending on the diagnosis including serum protein, lipid profile, 24-hour urine protein, and renal ultrasound scan.

Patients with acute glomerulonephritis (AGN) were treated conservatively according to the unit protocol with procaine penicillin, antihypertensives, diuretics, urine input and output monitoring, daily weighing, and four hourly blood pressure measurements. Nephrotic syndrome patients were treated with diuretics, steroid therapy, and angiotensin converting enzyme inhibitor. Those with recalcitrant edema received plasma transfusion. The steroid resistant and dependent patients received cyclophosphamide since our patients could not afford calcineurin inhibitors. Urinary tract infection (UTI) was treated with appropriate antibiotics according to the urine microscopy, culture, and sensitivity results. Nephroblastoma patients had nephrectomy and cytotoxic drugs (vincristine, Doxorubicin and actinomycin). Most patients with chronic renal failure were referred for renal replacement therapy although a few left against medical advice. The rest of the patients that recovered following treatment were followed up at our nephrology clinic.

The data obtained was analyzed using EPI info software version 7.1.0.6

### Results

During the period of study (2006 – 2016), a total of 8,711 patients aged 2 months to 17.3 years (mean age of  $7.6 \pm 5.1$  years) were admitted to the children's ward of UCTH.

Two hundred and sixteen (216) patients presented with renal disorders accounting for 2.5% of pediatric admissions. One hundred and seven (49.5%) were male and 109 (50.5%) were female children giving a male to female ratio of 1:1.

The spectrum of renal disorders is shown in Table 1. The commonest renal disorder in this study was acute glomerulonephritis (AGN), comprising 29.6% of the patients with renal disorder, followed by urinary tract infections (UTI) (27.8%) and nephrotic syndrome (22.7%). Among the 6 patients with acute renal failure, 2 were associated with acute glomerulonephritis, 2 with severe malaria, 1 with ingestion of herbal medication, and 1 with chronic pyelonephritis.

**Table 1.** Pattern of renal disorders in calabar

Renal disorder	Frequency	Percentage
Acute glomerulonephritis	64	29.6
Urinary tract infections	60	27.8
Nephrotic syndrome	49	22.7
Nephroblastoma	15	6.9
Chronic renal failure	10	4.6
Acute renal failure	6	2.8
Obstructive uropathy	5	2.3
Polycystic kidney disease	2	0.9
Renal calculi	2	0.9
Hemolytic uremic syndrome	1	0.5
HIV Associated Nephropathy	1	0.5
Sickle cell Nephropathy	1	0.5
<b>Total</b>	<b>216</b>	<b>100.0</b>

However, for 10 patients with chronic renal failure, 3 had chronic glomerulonephritis as the underlying cause and 3 had nephrotic syndrome, while the cause could not be identified in the remaining 4 cases.

One hundred and ninety-one (88.4%) were discharged, 13 (6%) left against medical advice, 6 (2.8%) absconded, 2 (0.9%) were referred, and 4 (1.9%) died from renal complications (Table 2).

**Table 2.** Outcome of illness among children with renal disorder

Outcome of illness	Frequency	Percentage
Discharged	191	88.4
Left against medical advice	13	6.0
Absconded	6	2.8
Referred	2	0.9
Death	4	1.9
<b>Total</b>	<b>216</b>	<b>100.0</b>

All the cases of acute renal failure had volume replacement, recovered, and were discharged. Two patients with chronic renal failure were referred for dialysis, 2 left against medical advice, and 6 were managed conservatively but were later lost to follow-up.

Comparison of the findings with an earlier study [16] in our center is shown in Table 3, suggesting that AGN remained the most common renal disorder with a prevalence of 29.6% in this study and 36.9% in our previous study [16] followed by urinary tract infections (UTI) comprising 27.8% of all cases in this study.

This finding was not consistent with our earlier study [16] in which nephrotic syndrome (NS) was the second commonest. In addition, comparison with studies from other parts of the country is shown in Table 4.

**Table 3.** Pattern of renal disorders in the present series compared with our previous study<sup>16</sup>.

Renal disorder	Present study n=216 (%)	Previous study <sup>16</sup> n=179 (%)
Acute glomerulonephritis	29.6	36.9
Nephrotic syndrome	22.7	30.7
Urinary tract infections	27.8	8.9
Nephroblastoma	6.9	6.2
Chronic renal failure	4.6	3.9
Acute renal failure	2.8	6.7
Obstructive uropathy	2.3	6.7
Polycystic kidney disease	0.9	-
Renal calculi	0.9	-
Hemolytic uremic syndrome	0.5	-
HIV Associated Nephropathy	0.5	-
Sickle cell Nephropathy	0.5	-

### Discussion

In the present study, renal disorders comprised 2.5 % of pediatric admissions during the study period with an equal sex predilection. This percentage is lower than 3.2% reported in the earlier study done in Calabar [16].

**Table 4.** Pattern of renal disorders in calabar compared with those in other centers

Renal disorders	Percentage of total					
	Present Study N=216	P/H <sup>14</sup> N=669	Enugu <sup>12</sup> N=854	Ibadan <sup>8</sup> N=196	Jos <sup>15</sup> N=69	Gusau <sup>18</sup> N=70
Acute glomerulonephritis	29.6	11.4	31.9	11.2	37.7	24.3
Urinary tract infection	27.8	68.9	5.6	3.6	11.6	34.3
Nephrotic syndrome	22.7	14.6	40.5	79.6	16.0	11.4
Nephroblastoma	6.9	1.6	4.9	15.3	7.2	-
Chronic renal failure	4.6	2.1	2.9	-	20.3	8.6
Acute renal failure	2.8	4.7	7.1	-	39.1	20.0
Obstructive uropathy	2.3	2.7	1.4	-	5.8	-
Polycystic kidney disease	0.9	-	-	-	1.5	-
Renal calculi	0.9	-	-	-	-	-
Hemolytic uremic syndrome	0.5	-	-	-	5.8	-
HIV Associated Nephropathy	0.5	-	-	-	-	-
Sickle Cell Nephropathy	0.5	-	1.3	-	-	-
Others	-	-	4.4	-	-	1.4

Acute glomerulonephritis (AGN) remained the most common renal disorder with a prevalence of 29.6% in this study and 36.9% in the previous study [16]. This finding also agrees with the studies conducted in Zaria [10] and Jos [15]. However, it disagrees with the studies performed in Enugu [12], Ibadan [8] and Ilorin [11] where nephrotic syndrome was the commonest. Reports from developing countries including Nigeria have shown a significant increase in the prevalence of acute nephritis [8, 19, 20]. This increase has been linked to the poor socio-economic condition of the region coupled with overcrowding and poor housing facilities [21]. However, the reality of this relationship is not certain, as most of these studies were hospital based. A community-based study is required to address this assertion.

Urinary tract infections (UTI) ranked second among renal disorders in this study, accounting for 27.8% of all the cases. This finding was not consistent with our earlier study [16] in which nephrotic syndrome (NS) was the second commonest renal disease. The reason for the difference between the two studies is unclear. However, it could be due to underreporting of UTI in the previous study. In addition, the prevalence of UTI in the present study was higher than the earlier reported prevalence of 8.9% [16]. This difference could be due to the higher index of suspicion and increased screening of suspected cases of UTI. Hence, screening for UTI using bedside urinalysis is recommended for all febrile

cases on admission. Urinary tract infections were the commonest renal disease in studies done at Port Harcourt (68.9%) [14], Benin (32.8%) [13] and Gusau (34.3%) [18], all in Nigeria. Routine treatment of febrile children for malaria in our environment without excluding UTI should be discouraged.

Nephrotic syndrome (NS) accounted for 22.7% of the renal disorders in this study, which was lower than the earlier prevalence of 30.7% obtained in the previous study [16]. The reason for this drop in the prevalence of NS is not clearly understood. NS is still among the commonest renal disorders in our environment as shown in studies conducted in Port Harcourt [14] and Benin [13], both in the southern geopolitical zone of Nigeria.

The prevalence of acute and chronic renal failure was 2.8% and 4.6% in this study, respectively. Similar results were obtained in Port Harcourt [14], Zaria [10], Ilorin [11] and Gasau [18], but a higher prevalence was observed in Jos [15] (Table III). In the previous study in Calabar [16], acute and chronic renal failure were associated with high fatality rates. This rate could not be accessed in this study because some of the cases were referred for dialysis (as our dialysis unit was not working effectively during the study period), some left against medical advice, and others were discharged.

Polycystic kidney disease, hemolytic uremic syndrome, renal calculi, HIV associated and sickle cell nephropathies were seen in the present study

but were absent in the earlier study [16] (Table II), indicating that the spectrum of renal diseases in Calabar is expanding. Hence, screening programs for early diagnosis should be encouraged in our environment. The spectrum of renal disorders in this study was similar to the findings from other parts of the country. Concerning the outcome, two of four fatalities recorded in this study were due to hypertension secondary to AGN: one case was due to advanced stage of nephroblastoma and another case had CKD with HIV associated nephropathy. These patients continued to have a poor prognosis because of late presentation to hospital for treatment.

### Conclusion

This study re-affirms that AGN is the most common childhood renal disorder in Calabar, closely followed by UTI. The pattern in Calabar is expanding similar to other parts of Nigeria with different frequencies. Management of these disorders will help to prevent progression to chronic renal disease. Preventive nephrology should be encouraged in our resource-poor setting where dialysis and renal transplantation are not readily available.

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### Conflict of Interest

We declare that there is neither conflict of interest nor funding for this work.

### Authors' contributions

Chigozie Uzomba carried out data collection, performed the literature search, statistical analysis, and data interpretation, and wrote the manuscript.

Joan Ikobah carried out data collection and read and corrected the manuscript

Imaobong Etuk conceptualized and designed the work, and read and corrected the manuscript.

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