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Paediatric renal diseases in Uyo, Nigeria: a 10-year review

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Abstract

Background: There is an emergence of the burden of chronic diseases like renal disorders worldwide. A periodic review of their prevalence and pattern serves as an invaluable tool in national health budgetary allocations. We describe these in our locality to determine any changes for improved childhood healthcare.

Methods: A 10 year prospective study of 162 children with various renal disorders seen in the only tertiary facility in Uyo, south-south Nigeria, was carried out. Children from birth to 17 years presenting with features suggestive of renal disease were admitted through the children outpatient clinic and the children emergency unit. Information obtained and recorded in the renal register included biodata, duration of

symptoms, clinical findings, laboratory results, diagnoses and treatment.

Results: Renal disorders accounted for 3.1% of the total paediatric patients with a significant increase from 2.8% in 2003 to 4.6% in 2012. Under fives constituted the highest frequency with a male to female ratio of 1.3:1. The commonest renal disorders were nephrotic syndrome (38.3%), AGN (14.2%) and nephroblastoma (11.1%). Chronic renal failure was commoner (11.1%) than acute renal failure (8.6%).

Conclusion: Nephrotic syndrome was the commonest childhood renal disorder and chronic renal failure is the predominant complication.

Key-words: kidney, children, pattern, Nigeria

Introduction

Communicable diseases continue to contribute significantly to childhood morbidity and mortality in the developing world,¹ necessitating the thrust of most of the health budget into its prevention and treatment. However, there is increasing evidence of the emergence of the burden of injuries, non-communicable diseases and chronic diseases like renal disorders.² A periodic review of the prevalence and pattern of such diseases will serve as an invaluable tool in guiding the national health policy makers in taking appropriate and relevant decisions as regards the allocation of the health budget.

Previous studies in the different regions of the world have documented various renal disease prevalence and patterns. This variation indicates a probable influence of genetic and environmental factors.³ It is therefore necessary for us to describe the prevalence and pattern in our own locality.

University of Uyo Teaching Hospital (UUTH), a tertiary health institution in the south- south region of Nigeria is relatively new but fast growing in acquisition of personnel and facilities. It transited from being a specialist hospital, to a Federal Medical Centre but is now the only tertiary health facility serving the 3.9 million people of Akwa Ibom State. In her Department of Paediatrics, operating since 2003 is a paediatric nephrology unit with a consultant paediatric nephrologist and other trained personnel. There is also a well established dialysis unit.

This study sets out therefore to document the pattern of renal diseases seen over the past ten years in this centre and determine if there is a change in prevalence and pattern with the improvement of healthcare delivery services over the years. It is expected that this information will assist in strategic planning for the hospital, Akwa Ibom State and Nigeria at large.

Methods

This was a longitudinal prospective study of renal admissions into the Renal Unit of the Department of Paediatrics, UUTH over a ten year period (January 2003 - December 2012). The department has two 47 bed wards for post neonatal care of children. A renal register for documentation of renal cases was opened in the department in 2003. Children from birth to 17 years presenting with features suggestive of renal disease, who were admitted for investigations and treatment were registered. Admission into the wards is via the Children's Outpatient clinic (CHOP) and the Children's Emergency Unit (CHEU). Investigation results were added to the data base as they were received and treatment modalities were recorded.

Information including age, sex, duration of illness before presentation, symptoms, clinical findings on examination, laboratory results, diagnosis, treatment were recorded in the renal register as the patients were admitted and data entered into excel spreadsheet. Routine laboratory requests in the unit tailored towards making a diagnosis include a full blood count, haemoglobin electrophoresis, malaria parasite, serum electrolytes, urea and creatinine, urinalysis, urine microscopy, culture and sensitivity, serum proteins, serum cholesterol, 24-hour urinary protein estimation, Hepatitis B surface antigen detection, Human Immunodeficiency Virus 1 and 2 screening. Further investigations include renal ultrasonography, intravenous urogram, micturating cysto-urethrography. However, Anti streptolysin O (ASO) titre, C3, C4 components of complement, anti DNase B titres as well as renal biopsy were not done for any of the children because of lack of facilities, although they were requested for when necessary.

An informed consent was obtained from the parent / guardian prior to registration. Children older than 10 years also gave a verbal consent. The study was approved by the University of Uyo Teaching Hospital Research and Ethics Committee.

Treatment modalities involved medical, surgical and renal replacement therapy when indicated and affordable. Referrals were made for renal transplantation as our center is yet to offer such

services.

Information was analyzed using SPSS version 17 and results were presented in simple tables and figures.

Results

One hundred and sixty two children with renal diseases were seen over the 10 year period. This constituted 3.1% of the 5,257 paediatric inpatients in our center. Figure 1 shows the proportion of renal patients seen annually as a proportion of the total paediatric admissions in the hospital. There was a significant increase from 2.8% in 2003 to 4.6% in 2012.

There were 93 (57.4%) males and 69 (42.6%) females giving a male to female ratio of 1.3:1. There was a male preponderance among children with nephrotic syndrome, urinary tract infection and expectedly posterior urethral valves. Wilm's tumour had an equal gender distribution (Table 1).

The age group with the highest frequency was the under five children, 62 (38.3%). Forty (24.7%) was of the 6-10 years of age group. Figure 2 shows the distribution of diagnoses according to age group. Nephrotic syndrome was seen more in children older than 10 years of age compared to other renal diseases.

The pattern of disorders is shown in Table 1. The commonest renal disease seen in the period under review was nephrotic syndrome (38.3%). A greater percentage (66.1%) had no obvious aetiological factor associated with it while sickle cell anaemia and human immunodeficiency virus infection accounted for 4.8% and 4.8% respectively. One patient had concomitant urinary tract infection caused by *Escherichia coli*.

Acute glomerulonephritis (AGN) was the second most frequent disorder, occurring in 23(14.2%) of the patients. There were more females than males and their ages ranged from 2 years to 13 years with a peak at five to seven years.

The third most frequent renal disorder was

Nephroblastoma (Wilm's tumour). It was found in 18 children with a male to female ratio of 1:1. The age range was ten months to ten years with a peak at 2 years to six years. The tumour was unilateral in all the patients with 55.6% occurring on the right side. Urinary tract infections were found in 9.3% of the patients in the series with a male to female ratio of 2:1. The age range was six weeks to 15 years with 60% of the patients older than 5 years of age. Out of the 15 cases, three who had pyelonephritis also presented with renomegaly confirmed by ultrasonography. *Escherichia coli* was the most frequently cultured organism; it was responsible for 46.7% of cases. Other isolated organisms were *Pseudomonas aeruginosa* (13.3%), *Klebsiella pneumonia* (13.3%) and *Staphylococcus aureus* (26.7%).

Chronic renal failure (CRF) was more common than acute renal failure (ARF) accounting for 11.1% of cases compared to 8.6% in ARF. The main causes of CRF included nephrotic syndrome (50%), chronic glomerulonephritis (33.3%) and obstructive uropathy (16.7%). The causes of acute renal failure were haemolytic uraemic syndrome (35.7%), nephrotic syndrome (28.6%), herbal toxins (21.4%), pyelonephritis (7.1%) and sickle cell anaemia (7.1%). Children with CRF were generally older, 88.9% of them being above 5 years and they were mainly females. On the other hand, more males had ARF and 57.1% of them were younger than 5 years.

Table 1: Pattern of Childhood Renal Diseases in Uyo, Nigeria				
Diagnosis	Number of patients			Percentage
	Male	Female	Total Number	
Nephrotic Syndrome	37	25	62	38.3
Acute glomerulonephritis	10	13	23	14.2
Nephroblastoma	9	9	18	11.1
Chronic renal failure	7	11	18	11.1
Urinary tract infection	10	5	15	9.3
Acute renal failure	9	5	14	8.6
Posterior urethral valve	9	0	9	5.6
Polycystic kidney disease	1	0	1	0.6
Urinary bladder calculus	1	1	2	1.2
Total	93	69	162	100

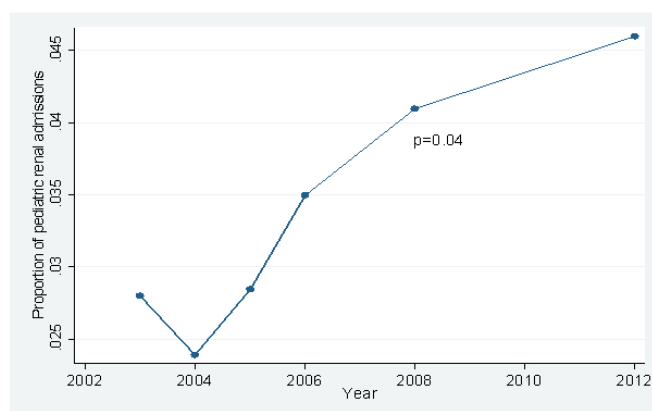


Figure 1: Trend graph showing an increase in pediatric renal admissions over the 10 year period

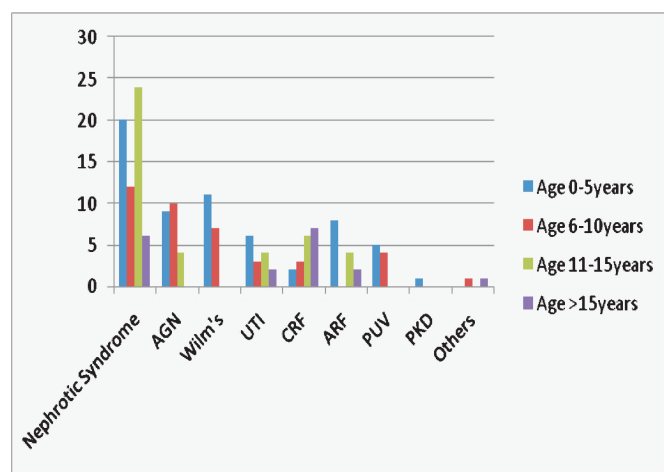


Figure 2: Age distribution of diagnoses according to age group

Discussion

The documented overall incidence of renal diseases of 3.1% over a ten year period in our center in the South-South region of Nigeria compares favourably with the 4.5%,⁴ 3.9%⁵ reported in south western Nigeria and 2.9%⁶ from the north central region. It is however, almost three times higher than an earlier report eighteen years ago from our region by Eke.⁷ This may likely be due to an increased awareness of

renal diseases, probably as a result of improved health care facilities (well established renal dialysis units) and presence of trained paediatric nephrologists in the referral centers in our region over the years. The regular teaching courses as part of continuing medical education has also equipped medical officers with appropriate knowledge for early identification, diagnosis and referral of these renal patients. These factors probably also explain the steady increase of renal admissions from 2.8% in 2003 to 4.6% in 2012 in our center. In contrast, among hospitalized Nepalese children over a five year period, a higher proportion (6.3%)⁸ had renal disease.

The spectrum of renal diseases continues to vary from region to region. We report nephrotic syndrome as the commonest childhood renal disease in this study (38.3%). This was also the findings of previous studies in Nigeria^{5,9-11} and Jordan.¹³ In contrast, studies from Jos⁶ and Zaria¹³ (northern regions of Nigeria), nephrotic syndrome ranked second to acute glomerulonephritis with 19.3% and 16% prevalence respectively. This may be a reflection of the differences in the environmental and perhaps socioeconomic status between the northern and southern parts of the country as AGN most commonly is post infectious in origin. Similarly, in a study from Sudan, nephrotic syndrome was found to be the second common paediatric renal disease with 15% prevalence.³

The finding of nephrotic syndrome in older children compares with the study in Benin.⁴ This, however, contrasts the experience in Lagos⁵ where its incidence fell sharply after the age of 10 years and reports from Benin,¹⁴ Ibadan¹⁵ and Enugu¹⁶ where its peak age incidence was 5-8 years.

Acute glomerulonephritis (AGN) was the second most common renal disorder encountered in this study. We diagnosed AGN in 14.2% of our patients. This was the experience of previous workers who reported comparable figures of 11.2%,¹⁰ 11.4%,⁷ 20.0%,⁴ 24.1%⁵ and 28.7%¹¹ from the southern part of the country. Uncontrollable use of antibiotics leading to a low streptococcal infection may be contributory to these low prevalence rates in our environment. In contrast, higher prevalence rates from an earlier report

of 39.1%¹³ from Zaria and a recent report of 37.7%⁶ from Jos suggests a lower standard of personal hygiene and environmental sanitation, as the association between low socioeconomic standards and AGN has been well documented.¹⁷ Higher prevalence rates have also been reported in Libya¹⁸ and South African¹⁹ black population. The females had a higher predilection for AGN as noted by Ibadin²⁰ in Benin.

We report a higher prevalence of nephroblastoma (11.1%) compared to most African (2.5%)³ and Nigerian studies. Jos reported 7.2%,⁶ Benin 6.8%,⁴ Calabar 6.2%,²¹ Enugu 4.9%,⁹ Port-Harcourt 1.6%⁷ and Zaria 3.1%.¹³ This wide variance of prevalence rates in the different parts of the country probably explains the difficulty in identifying specific aetiological factors related to this major childhood renal malignancy. Its unilateral occurrence has also been reported by other workers.^{6,9} They also reported a similar age incidence.

Urinary tract infection (UTI) accounted for 9.3% of the renal population in this study, the commonest offending organism being *Escherichia coli*. This finding is comparable to the 3.6%, 5.6% and 7.0% from Ibadan,¹⁰ Enugu⁹ and Zaria.¹³ However, higher prevalence rates were obtained from Sudan (30%),³ Venezuela (32%)²² and Nigeria (68.9% and 32.8% from Port-Harcourt⁷ and Benin⁴ respectively). Our low prevalence could be explained by the fact that not all patients were screened for UTI, only those that were symptomatic and had specific indications because quite a number of the patients could not afford to pay for all investigations ordered, so the investigations were prioritized. Also, in those that were screened, the high rate of negative cultures may be due to indiscriminate use of antibiotics before presentation in the hospital. Moreover, most of the cases of UTI in our center are treated on outpatient basis while this analysis is based on inpatients.

About 20% of our patients presented with renal failure. A greater percentage (11.1%) presented with chronic renal failure (CRF) compared to earlier reports of acute renal failure (ARF) as a commoner diagnosis. The lower percentage (8.6%) of ARF could be attributed to a decline in the prevalence of

preventable causes of ARF like diarrhoeal diseases and AGN, leaving renal causes like chronic glomerulonephritis as the major cause of renal failure, as seen in this study. Kandoth and his coworkers²³ in India documented a similar finding. Haemolytic uraemic syndrome (HUS) was the leading cause of ARF in our study. This observation agrees with the study from Nepal³ and Flynn's study²⁴ who noted a 31% prevalence of HUS in developing country compared to 3% in a developed country. However, earlier African studies²⁷⁻²⁸ reported HUS as a rare aetiologic entity for ARF in Africa. This change in pattern may be related to a higher index of suspicion in our setting. More boys were seen with ARF compared to CRF that had a female preponderance. Also, ARF occurred in the younger age group than CRF. This is comparable to other studies^{23,25} within and outside the country.

The prevalence rate of CRF of 11.1% reported in our study compares favourably with other studies; Jos, Nigeria (20.3%),⁶ Iran (14.9%)²⁹ and Jordan (17.3%).³⁰ However, lower rates were reported from other studies; Nigeria (2.1%),⁷ Venezuela (1.6%),²² Nepal (4.2%)⁸ and Sudan (4.0%).³ The high prevalence we recorded may be due to lack of early diagnosis, mismanagement at various primary and secondary health facilities, late presentation to our referral center and financial constraints that plague most of our patients. The commonest cause of CRF in our series was nephrotic syndrome (50%), closely followed by chronic glomerulonephritis (33.3%) and obstructive uropathy (16.7%). This is similar to studies from other developing countries³¹⁻³² where chronic glomerulonephritis was also a predominant cause of CRF. In contrast, renal stones was the commonest cause in Sudan³ and some Arab countries.³³⁻³⁴

In this study, posterior urethral valve was the commonest cause of obstructive uropathy with a prevalence of 5.6%. This is comparable to the Nepal⁸ study but lower than reports from Venezuela (25%)²² and Jordan (28.4%).³⁰ Our low rates may be due to low antenatal screening rates, lack of advanced facilities for early diagnosis and poor health seeking behaviour, mostly as a result of poverty.

Conclusion

We report nephrotic syndrome as the commonest

childhood renal disorder in Uyo and chronic renal failure as the predominant complication. There is need for establishment of more paediatric renal dialysis and transplantation units throughout the country to cater for the increasing need for paediatric renal replacement therapy. The government should also be sensitized on significant subsidization of paediatric renal replacement therapy to reduce childhood mortality from end stage renal diseases. Finally, medical personnel should have a high index of suspicion of HUS as an emerging aetiology of ARF in our environment.

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