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Pattern of Pediatric Kidney Diseases in a Tertiary Care Center in Northeast India: a 5-year Retrospective Analysis

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Introduction: The pattern of kidney diseases in children may vary from place to place and is not documented in most parts of India including ours. Documenting the spectrum may be important as it can have several uses.
Materials and Methods: This hospital-based retrospective descriptive study was done over a 5-year period.
Results: Out of 8257 admissions, 556 renal admissions occurred in 326 children which accounted for 6.7% of all admissions. The mean age of the children admitted with kidney disease was 9.9±4.9 years with a gender ratio of 1:1.02. The most common diagnosis at discharge was postinfectious glomerulonephritis (n= 103, 31.6%), closely followed by nephrotic syndrome (n=98, 30.1%). Glomerulonephritis other than PIGN comprised 9.8% of the cases (n=32). Other diagnoses in a descending order were urinary tract infection (n=36, 11.0%), chronic kidney disease (n=8.0%), AKI (n=14, 4.2%), congenital anomalies of the kidney and urinary tract (CAKUT) (n=10, 3.1%), calculus (n=5, 1.5%) and others (0.9%).
Conclusions: Postinfectious glomerulonephritis was the most common cause of renal admission in our series. Glomerular diseases constituted three quarters of all renal diseases. The load of tubular disorders was very low.

Keywords: Chronic Kidney disease; Post streptococcal glomerulonephritis; Nephrotic Syndrome; Child.

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Running Title: Pediatric Kidney Diseases in India

Introduction

The pattern of kidney diseases varies from place to place due to genetic differences, access to health care, socioeconomic status, and the pattern of background infections [1-3]. Knowledge of the pattern of pediatric kidney diseases in certain areas is important for developing services, determining training and infrastructure needs, devising preventive strategies, and for advocacy. Moreover, kidney diseases in children could be the beginning of a path leading to chronic kidney diseases (CKD) in adulthood [4].

The northeast area of India is a predominantly tribal, resource-limited area where the pattern of kidney disease in children has not been documented. It is known that the pattern of diseases may be different in disadvantaged population owing to poverty, poorer access to health care, poorer health seeking behaviors as has been shown for chronic kidney disease [3]. Therefore, we carried out this study to document the pattern of childhood kidney disease admissions in our institute. Our institute is a growing tertiary

care referral center in a north eastern tribal state with one trained pediatric nephrologist working in the General Pediatrics Department and no adult nephrology department. Thus, all childhood kidney diseases are treated in the department of pediatrics. Therefore, our data are likely to reflect the true pattern of childhood kidney diseases in the tribal northeast states of India.

Materials and Methods

Data were collected retrospectively from January 2011 to December 2015 from the inpatient register of pediatric ICU and pediatric general ward. Admissions of children above 1 month to less than 18 completed years with a discharge diagnosis related to kidney diseases were identified. Duplicate entries due to multiple admissions were filtered using the name and the central registration number. The discharge summaries were retrieved and the diagnosis was verified. In case of multiple admissions, the age at first admission was taken and in case of diagnosis revision, the revised diagnosis was retained. The data were managed with the Microsoft Excel using descriptive statistics, including mean, standard deviation, and proportion. Standard definitions were used for diagnosis of nephrotic syndrome, acute nephritis, and other diagnoses [5]. CKD was defined as stage 3 or beyond as per NKF-KDOQI guidelines [6]. AKI was defined using the acute kidney injury network criteria [7]. This study was approved by the Institute Ethics Committee and was performed in accordance with the relevant guidelines and regulations.

Results

During the study period, there were 8257 admissions to the pediatric ward and ICU of which 556 admissions occurred in 326 children. Thus, kidney diseases accounted for 6.7 % of all admissions. The mean age of children admitted with kidney disease was 9.9 ± 4.9 years with a gender ratio of 1:1.02

The most common diagnosis at discharge was postinfectious glomerulonephritis (PIGN) (n= 103, 31.6%), closely followed by nephrotic syndrome (n=98, 30.1%). Glomerulonephritis other than PIGN comprised 9.8% (n=32) of total admissions, included lupus nephritis (4.0%), HSP nephritis (3.7%), and IgA nephropathy (1.5%). Other diagnoses in descending order were urinary tract infection (n=36, 11.0%), chronic kidney disease (n=8.0%), AKI (n=14, 4.2%), congenital anomalies of the kidney and urinary tract (CAKUT) (n=10, 3.1%), calculus (n=5, 1.5%) and others (0.9%). Glomerular diseases (nephrotic syndrome and glomerulonephritis) accounted for almost 75% of all cases (71.5%). The diagnosis spectrum is detailed in Figure 1.

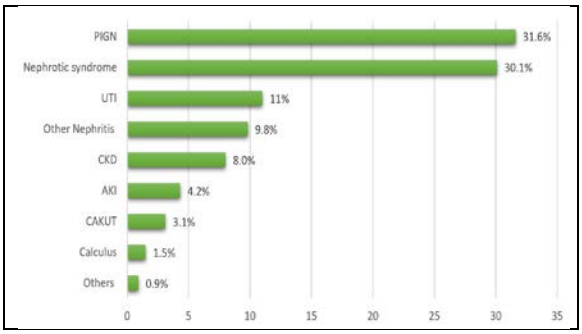

Figure 1. Frequency of renal admissions according to diagnosis

Of 103 children with PIGN, all had either clinical (preceding history of sore throat or impetigo) or serological (elevated antistreptolysin O titer) evidence of streptococcal infection. Thus, PIGN mostly consisted of acute post streptococcal glomerulonephritis (APSGN). Of 98 cases of nephrotic syndrome, 12 (12.4%) were steroid resistant and the rest were steroid sensitive. The load of AKI was likely to be grossly underestimated, as the source of identifying patients was the inpatient register that lists the primary cause of admission and discharge and not the complications of the disease.

The age-wise frequency of admissions showed three distinct peaks at less than 5 years, 5-12 years, and 12-18 years, which accounted for 15.9%, 39.4%, and 44.6% of total admissions, respectively (Figure 2).

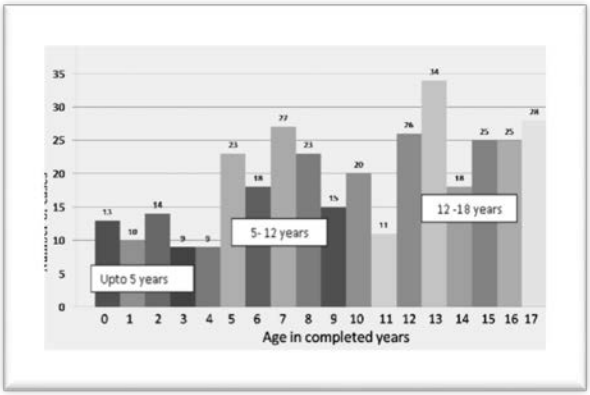

Figure2. Frequency of kidney disease admissions in each 1-year age band

Further analysis of these peaks revealed a different pattern of the disease in different age-band peaks as detailed in Table 1.

Table 1. Proportion of various diagnoses across age ranges

Diagnosis	Proportion of various diagnosis across age ranges		
Age (year)	0- 5	5-12	12-18
Glomerulonephritis	4.9 %	49.5%	47.6%
Nephrotic syndrome	17.3%	44.9%	38.8%
UTI	44.4%	25%	30.5%
SLE	0%	23.1%	69.2%
Chronic Kidney disease	7.7%	15.4%	76.9%
CAKUT	50%	40%	10%
Overall	15.9%	39.4%	44.6%

The first peak at 0-5 years primarily consisted of the cases of CAKUT and UTI with some cases of nephrotic syndrome and a few cases of acute glomerulonephritis. The second peak at 5-12 years mostly consisted of nephrotic syndromes and acute glomerular nephritis. The adolescent peak mainly consisted of nephrotic syndrome and acute nephritis but accounted for most of the load of chronic kidney disease and lupus nephritis.

Discussion

The reports from different parts of the world suggest that pediatric renal diseases comprise 1.8-7.8% of all patients admitted to a general pediatric department [8-15]. In our series, kidney disease accounted for 6.7% of all admissions. This figure is towards the higher end of the range and indicates that renal disease contributes to a significant proportion of pediatric admissions, and is an important cause of morbidity in this region. Glomerular diseases are the commonest cause of admission accounting for about 75% of all renal diagnoses.

Postinfectious glomerulonephritis was the most common renal diagnosis requiring admission to our unit, closely followed by nephrotic syndrome. A review of the literature did not reveal many reports of the spectrum of kidney diseases in India and only one paper from Kashmir was found [8]. However, the literature suggests that in India, the load of post streptococcal glomerulonephritis that used to be high in 1970's has gradually decreased over years and idiopathic nephrotic syndrome continues to be a common problem [2, 16]. Although acute glomerulonephritis accounted for a modest proportion of children with kidney diseases in Kashmir, reports from neighbouring countries like Nepal reveal that post streptococcal glomerulonephritis continues to be a common problem in developing countries [8, 12-13]. Although all children with a diagnosis of PIGN in our series had either clinical or serological evidence of preceding streptococcal infections, the term PIGN was retained, since the evidence of preceding streptococcal infection in form of history and single ASLO titer is not compelling and may be debated. Our findings indicated that PIGN (including APSGN) still continues to be a problem in India, at least in certain areas.

According to Table 2, the data of general pediatric facilities suggest a higher incidence of acute glomerulonephritis whereas the data of pediatric nephrology centers indicate the higher proportion of nephrotic syndrome and CKD. This trend obviously depicts referral bias, as postinfectious glomerulonephritis does not usually need referral to pediatric nephrology centers. Moreover, as most publications occur in pediatric nephrology centers, the frequency of postinfectious nephritis (including post streptococcal) in developing countries might be underestimated.

Idiopathic nephrotic syndrome is a common pediatric renal problem and is the second most common renal diagnosis in our unit. Nephrotic syndrome accounted for most multiple admissions in our series. Most of the children required multiple admissions due to severe edema and infection. Urinary tract infection with or without CAKUT was also a common cause of admissions. However, as many of the UTIs can be managed in an outpatient setting, any inpatient series like ours would underestimate its true burden.

Other types of glomerulonephritis like lupus nephritis, HSP nephritis, and IgA nephropathy were relatively common and all together accounted for about 10% of all admissions. These are potentially preventable causes of chronic kidney disease and may contribute to the CKD load of adolescents and adults in the region. In the background of the high load of acute post streptococcal nephritis, a diagnosis of such conditions may be missed at the level of first contact to health care. Awareness of pediatricians about this condition could lead to better diagnosis, referral, and follow up. CKD comprised 10% of the load.

Table 2. Pattern of glomerular disease reported from various developing countries

Authour; year (country)		Dhaka 2016	Bhatt N et al 2008 (Nepal)	Yadav SP et al; 2007 (Nepal)	Moorani KN et al 2013 (Pakistan)	Ali EM et al Sudan (2012)	Ibasdin Okoeguale Michael et al 2003 (Nigeria)	Mohd Ashraf et al 2016 (Kashmir, India)	Current study (north east India)
Setting		Pediatric nephrology	Pediatrics	Pediatrics	Pediatric nephrology	pediatrics	Pediatrics	Pediatrics	Pediatrics
Diseases rank	First	Nephrotic syndrome	Glomerulo nephritis	AGN	Nephrotic syndrome	UTI	UTI	AKI	PIGN
	Second	CKD	Nephrotic Syndrome	Nephrotic syndrome	CKD	Nephrotic Syndrome	Nephrotic syndrome	UTI	Nephrotic Syndrome
	Third	Glomerulo nephritis	CAKUT	UTI	CAKUT	Stones	AGN	CAKUT	UTI
	Fourth	AKI	CRF	AKI	ARF	AGN	CKD	Nephrotic syndrome	Other Nephritis
	Fifth	UTI	ARF	CAKUT	AGN	CAKUT	Tumors	AGN	CKD

Chronic kidney diseases are quite often diagnosed late, thereby denying any possible intervention to prevent progression. Moreover, the patients can seldom afford transplant or even a regular dialysis program. This state is no different from most resource limited areas [19].

APSGN has conventionally been regarded as a benign acute kidney disease. However, it has recently been proposed that it may be a strong risk factor for CKD in later life [20]. This may further be increased by a second hit later in life with problems like hypertension and diabetes in adulthood. The high rate of the occurrence of poststreptococcal nephritis and an apparent high load of CKD in adults in the local tribal community indicates a potential link. Furthermore, attention should be paid to the very low load of renal tubular disorders, which may indicate a lower prevalence of tubular disorders in the tribal population of northeast India. The major limitation of the study was its retrospective design. Moreover, because only hospital admissions were counted and cases were identified from the admission and discharge register, a gross underestimation of AKI and UTI is expected.

Conclusions

we conclude that kidney diseases are important cause of morbidity. High load of glomerular diseases in our area may offer a potential for intervention to decrease progression to chronic kidney disease in later life.

Conflict of Interest

Authors declare that they have no conflicts of interest.

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