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Changing pattern of renal disease in children at pediatric nephrology clinic of a tertiary teaching hospital, Nepal: 10-year review

Prerana Kansakar[1], Md. Firoz Anjum[2], Sunil Kumar Daha[3], Anish Karn[4]

[1]Asst. Prof., [2]Lecturer, Dept. of Pediatrics, [4]Medical Officer, Dept. General Practice and Emergency Medicine, Patan Hospital, Patan Academy of Health Sciences, Lalitpur, Kathmandu, Nepal; [3]Medical Officer, Bardibas Hospital, Bardibas, Nepal

Correspondence
Prerana Kansakar
Dept. of Pediatrics, Patan Hospital, Patan Academy of Health Sciences, Lalitpur, Nepal
Email: preranakansakar@hotmail.com

Peer Reviewers
Asst. Prof. Dr. Tripti Shakya
Patan Academy of Health Sciences

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Abstract

Introduction: Children present with different renal diseases with variations according to different geographic locations. This study aims to determine the trend of pediatric renal disease presenting.

Method: This retrospective study from pediatric nephrology clinic register during 2008 to May 2018 at Patan Hospital, Patan Academy of Health Sciences, Nepal to analyze the changing pattern of renal disease. The prevalence and characteristic of renal diseases were compared between the 1st and 2nd 5-y period, the age at presentation and gender was analyzed. Mean age at presentation was analyzed by independent t-test, a p-value <0.05 was considered significant. The study was approved by the ethical committee.

Result: A total of 352 children visited the nephrology clinic, male:female ratio 1.42:1, mean age 6.25±4.5 y, the majority in 0-5 y. Congenital anomalies of the kidney and urinary tracts (CAKUT) were 39%, mostly vesicoureteral reflux. Acute glomerulonephritis and the nephrotic syndrome were seen in 32.7% and 23.6%. Children <5 y of age presented with CAKUT while ≥5 y with acute glomerulonephritis. The mean age at presentation for CAKUT was 2.9±3 y and acquired diseases 8.46±3.91 y, p-value<0.05; and for glomerulonephritis 9.8±2.91 y and nephrotic syndrome 6.91±4.08 y, p-value<0.05.

Conclusion: There was a decrease in the number of children visiting the nephrology clinic. Children <5 y presented with CAKUT while ≥5 y had acquired conditions. Children with acute glomerulonephritis were of a higher age than children with nephrotic syndrome.

Keywords: Congenital anomalies of kidney and urinary tracts, glomerulonephritis, nephrotic syndrome, renal

Introduction

The pediatric population can present with a broad spectrum of renal diseases, ranging from congenital anomalies of the kidney and urinary tracts (CAKUT) to acquired kidney disorders. They can present with a treatable disorder to a life-threatening condition. The causes of renal diseases differ in developed nations from under-developed or developing nations.[1-6] The causes also differ in different geographical locations of the same nation.[4,7-9] The cause of this variation has been attributed to genetic, racial, environmental differences and differences in the level of awareness.[1]

At present, there is no registry system at the national level to record data of pediatric renal diseases, and past data describing the spectrum of renal diseases among the pediatric population in Nepal is scarce.[7-9] The previous studies done in the eastern and western regions of Nepal showed a varying pattern of renal disease.[7-9] This study aims to determine the trend of pediatric patients presenting with renal disease in the Pediatric Nephrology Clinic at Patan Hospital, Patan Academy of Health Sciences (PAHS) over ten years. Findings of this study may add to the existing information about the pattern of renal disease available in the country.

Method

This was a retrospective cross-sectional study done by using data from the pediatric nephrology clinic register of Patan Hospital, PAHS after approval from the institutional review committee (IRC) of PAHS, ref no. drs2001021332. We included data of all the children in the pediatric age group (0-14 years) who visited the pediatric nephrology clinic from April 2008 to May 2018. The pediatric nephrology clinic of the hospital runs once a week. The register has information on hospital number, date of visit, age, sex, and final diagnosis. Data was carefully reviewed and all patients with incomplete data were excluded. One patient data was only counted once despite more than one visit. The age included age at initial presentation. To avoid recruiting a patient more than once, where a patient has more than one diagnosis, the primary disease was considered. The objective of the study was to determine the changing pattern of renal disease in children at the pediatric nephrology clinic at PAHS. Data were analyzed to find out the prevalence and characteristics of renal diseases of pediatric patients, the changing pattern of renal diseases over the 10-y period, and to compare the changes between the 1st and 2nd 5-y period. Comparative analysis of the age of patients with CAKUT versus acquired conditions and acute glomerulonephritis versus nephrotic syndrome was done. The data were entered in Microsoft Excel and analyzed using SPSS 16. The prevalence of the various diagnoses was expressed in number and percentage. The age at presentation and sex was analyzed and expressed as means and proportion respectively. Comparative analysis for mean age at presentation was done using an independent t-test. A p-value <0.05 was considered significant

Result

A total of 352 new patients visited the pediatric nephrology clinic over the 10-y study period from April 2008 to May 2018. There were 207(58.8%) males and 145(41.2%) females, male:female ratio of 1.42:1. In most of the disease conditions, the male patients were more than the female patients, Table 1.

The ages ranged between three days of life to 14 years, mean age 6.25±4.5 y. Maximum numbers of cases were in the age group of 0-5 y (43.7%) followed by 10-14 y (30.7%) and 5-10 y (25.6%) respectively, Table 2.

Among the 352 patients presenting to the clinic, the most common diagnosis was CAKUT diagnosed in 137(39%). Among these children with CAKUT, 101 had vesicoureteral reflux (VUR) followed by hydronephrosis in 16. Diagnosis of acute glomerulonephritis was made in 115(32.7%) patients out of which 109

were post-streptococcal glomerulonephritis and four patients had SLE nephritis. Nephrotic

syndrome was diagnosed in 83(23.6%) children out of which 60 were steroid-responsive infrequently relapsing nephrotic syndrome, 11 were steroid-dependent, eight were steroid-resistant, and four were frequently relapsing nephrotic syndrome. Six out of eight cases of steroid-resistant nephrotic syndrome had a renal biopsy done which showed focal segmental glomerulosclerosis (FSGS).

The most common renal disorder in children aged less than five years was CAKUT while in both age groups of 5-10 y and ≥10 y was acute glomerulonephritis followed by nephrotic syndrome, Table 1. The age of children presenting with CAKUT was 2.9±3 y and presenting with other acquired conditions was 8.46±3.91 y (p-value<0.05). Most cases of acute glomerulonephritis were in the age group of 10-14 y and of nephrotic syndrome in 5-10 y. The mean age of children with glomerulonephritis was 9.8±2.91 y and nephrotic syndrome 6.91±4.08 y, p-value<0.05.

Table 1. Gender wise distribution of renal diseases in children at pediatric nephrology clinic of a tertiary teaching hospital, Nepal, (N=352)

Diagnosis	N(%)	Male	Female
Total renal cases	352(100)	207(58.8)	145(41.2)
CAKUT*	137(39))	73(20.7)	66(18.7)
VUR#	101(28.7)	47(13.3)	54(15.3)
Hydronephrosis	16(4.5)	14(4)	4(1.1)
Renal agenesis	5(1.4)	3(0.9)	2(0.6)
Small kidney	4(1.1)	3(0.9)	1(0.3)
Posterior urethral valve	4(1.1)	4(1.1)	0
Multicystic dysplastic kidney	2(0.6)	1(0.3)	1(0.3)
Pelvi-ureteric junction obstruction	1(0.3)	0	1(0.3)
Ectopic kidney	1(0.3)	0	1(0.3)
Horse shoe kidney	1(0.3)	0	1(0.3)
Rectovaginal fistula	1(0.3)	0	1(0.3)
Renal cortical cyst	1(0.3)	1(0.3)	0(0.3)
Glomerulonephritis	115(32.7)	74(21.1)	41(11.6)
Post streptococcal glomerulonephritis	109(31)	71(20)	39(11)
SLE nephritis$	4(1.1)	1(0.3)	3(0.9)
Mesangioproliferative glomerulonephritis	1(0.3)	1(0.3)	0
HSP nephritis^	1(0.3)	1(0.3)	0
Nephrotic syndrome	83(23.6)	51(14.5)	32(9.1)
Steroid sensitive infrequently relapsing	60(17)	35(9.9)	25(7.1)
Steroid dependent	11(3.1)	9(2.5)	2(0.6)
Steroid resistant	8	3(0.9)	5(1.4)
Frequently relapsing	4(1.1)	4(1.1)	0
Nephrolithiasis	4(1.1)	1(0.3)	3(0.9)
Renal tubular acidosis	4(1.1)	3(0.9)	1(0.3)
Urinary tract infection	4(1.1)	2(0.6)	2(0.6)
Primary nocturnal enuresis	2(0.6)	2(0.6)	0
Acute kidney injury following wasp bite	1(0.3)	1(0.3)	0
Hemolytic uremic syndrome	1(0.3)	1(0.3)	0
Voiding dysfunction	1(0.3)	1(0.3)	0

*Congenital anomalies of the kidney and urinary tracts, #Vesicoureteral reflux, $Systemic lupus erythematosus nephritis, ^Henoch- Schonlein Purpura

Table 2. Distribution of diagnosis according to age group

Diagnosis	N(%)	Age 0-5 y	Age 5-10 y	Age >10 y
Total renal cases	352(100)	154(43.7)	90(25.6)	108(30.7)
CAKUT*	137(39))	109(31)	20(5.7)	8(2.3)
VUR#	101(28.7)	84(23.9)	15(4.3)	2(0.6)
Hydronephrosis	16(4.5)	11(3.1)	0	5(1.4)
Renal agenesis	5(1.4)	3(0.9)	2(0.6)	
Small kidney	4(1.1)	3(0.9)	1(0.3)	
Posterior urethral valve	4(1.1)	3(0.9)	1(0.3)	
Multicystic dysplastic kidney	2(0.6)	2(0.6)	0	
Pelvi-ureteric junction obstruction	1(0.3)	1(0.3)	0	
Ectopic kidney	1(0.3)	1(0.3)	0	
Horse shoe kidney	1(0.3)	0	1(0.3)	
Rectovaginal fistula	1(0.3)	1(0.3)	0	
Renal cortical cyst	1(0.3)	0	0	1(0.3)
Glomerulonephritis	115(32.7)	7(2)	40(11.4)	68(19.3)
Post streptococcal glomerulonephritis	109(31)	7(2)	36(10.2)	66(18.8)
SLE nephritis$	4(1.1)	0	2(0.6)	2(0.6)
Mesangioproliferative glomerulonephritis	1(0.3)	0	1(0.3)	0
HSP nephritis^	1(0.3)	0	1(0.3)	0
Nephrotic syndrome	83(23.6)	26(7.4)	28(8)	29(8.2)
Steroid sensitive infrequently relapsing	60(17.1)	20(5.7)	22(6.3)	18(5.1)
Steroid dependent	11(3.1)	3(0.9)	4(1.1)	4(1.1)
Steroid resistant	8(2.3)	2(0.6)	0	6(1.7)
Frequently relapsing	4(1.1)	1(0.3)	2(0.6)	1(0.3)
Nephrolithiasis	4(1.1)	4(1.1)	0	0
Renal tubular acidosis	4(1.1)	4(1.1)	0	0
Urinary tract infection	4(1.1)	2(0.6)	1(0.3)	1(0.3)
Primary nocturnal enuresis	2(0.6)	0	0	2(0.6)
Acute kidney injury following wasp bite	1(0.3)	1(0.3)	0	0
Hemolytic uremic syndrome	1(0.3)	1(0.3)	0	0
Voiding dysfunction	1(0.3)	0	1(0.3)	0

*Congenital anomalies of the kidney and urinary tracts, #Vesicoureteral reflux, $Systemic lupus erythematosus nephritis, ^Henoch- Schonlein Purpura

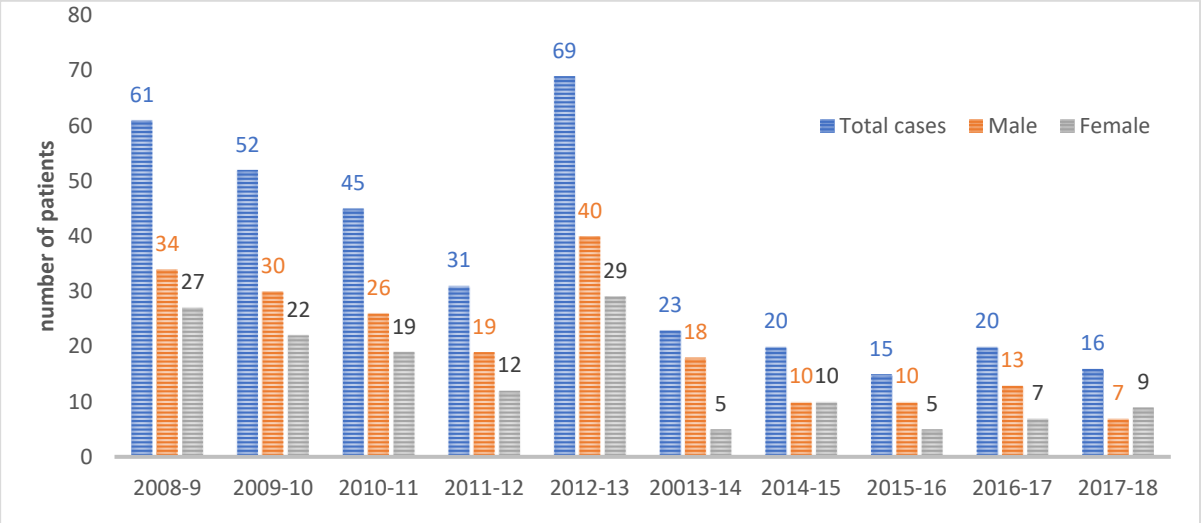

Figure 1. Trend of pediatric renal patients over the ten years

The trend of the pediatric patients visiting the pediatric nephrology clinic during the study period shows the maximum number of patients was seen during 2012-2013 followed by 2008-2009, Figure 1. Overall, there is a decreasing trend in the number of patients that visited the nephrology clinic. The first five years saw a total of 258 which decreased to 94 patients in the last five years. Male patients were more throughout most of the years.

Discussion

In our study, 352 new patients presented to the nephrology clinic during 10-y. A study done at a tertiary care university teaching hospital in eastern Nepal showed 651 children with the renal disease during 5-y (April 2002 to March 2007).[8] Another study in the same institute found 206 cases in a 2-y period (February 2011 to January 2013).[9] Studies done at Manipal teaching hospital, Pokhara, showed 228 cases of renal disease during 6-y (September 2000-September 2006).[7] All these studies included cases from both outpatient department and/or admitted cases which might have led to more renal cases than ours.

There was a decrease in trend in the visit to the nephrology clinic over the 10-y in present study This is in contrast to a study done in Nigeria which showed an increasing trend.[6] They included admitted patients which might have led to the different findings. In the early years of study, Patan Hospital, PAHS was one of the major hospitals handling cases from the surrounding areas and also was the major site of referral from various hospitals for management of complicated renal cases. In the later years, there were many new hospitals around the area to be able to handle these cases. This might have caused a decrease in the cases visiting our hospital.

In our study, most patients 154(43.75%) were aged 0-5 y and only 108(30.7) in 11-14 y. This was similar to a study from Sudan.[5] A study from Nepal found more renal disease in the age group 5-10 y.[7,9] This might be due to the difference in inclusion criteria. Also, the major number of children in the age group of 0-5 y was VUR which were cases referred from various other centers for investigation which was available in our center at that time. Similar to other studies, there were more male children with renal diseases than female children.[2,5,7-11]

The most common renal diseases in our study were CAKUT. Most of the children with CAKUT had VUR, similar to other studies.[12] This is in contrast to other studies that report urinary tract infection (UTI) as the common disorder.[3,4,7,13] The difference can be because most of the children with VUR presents with UTI[12,14] but due to the inclusion of primary diagnosis in our study, the number of UTI had less representation. Also, children with UTI who did not have other associated problems were not followed in the nephrology clinic which might have decreased the number of UTI cases in our study. Studies have found pelvic ureteric junction obstruction to be the most common form of CAKUT.[10,14] Other studies have reported nephrotic syndrome[8] being the most common diagnosis and acute glomerulonephritis[9] as the most common diagnosis.

Among cases diagnosed as acute glomerulonephritis, most of the cases were of post-streptococcal glomerulonephritis. This finding is similar to most of the studies.[2,3,7-9] The common age group of acute glomerulonephritis was the age group of 10-14 y similar to other studies.[9]

Among the children with nephrotic syndrome, most were steroid-responsive with infrequent relapse. This finding was similar to other studies.[5,8,15] The most common indication of renal biopsy was steroid-resistant nephrotic syndrome and the most common diagnosis in these children were focal segmental glomerulosclerosis, similar to other studies.[16]

The mean age of children with nephrotic syndrome was 7.33±4.08 y which was similar to another study.[9] The age of presentation of

acute glomerulonephritis was 9.8±2.91 y similar to other studies.[9,17] Most of the children with acute glomerulonephritis were of age 10-14 y and nephrotic syndrome 5-10 y, as reported by another study.[9]

The age of children presenting with CAKUT was 2.9±3 y and presenting with acquired conditions was 8.46±3.91 y, p<0.05. The most common renal disorder in children <5 y was CAKUT while in both age groups 5-10 y and 10-14 y was acute glomerulonephritis followed by nephrotic syndrome. This finding is similar to other reported studies.[4]

Our findings show, in 1st 5-y of the study period, the most common diagnosis was CAKUT followed by acute glomerulonephritis and nephrotic syndrome. This is unlike the findings from studies done in the same period.[9] The incidence of CAKUT in our study could be high because most children were referred to our center for performing Micturation cystourethrogram (MCUG) because of the availability of this procedure. In addition, the guidelines were less stringent about performing this procedure which might have increased the diagnosis of CAKUT.[18,19] In the 2nd 5-y of the study period, the most common diagnosis was acute glomerulonephritis followed by CAKUT and nephrotic syndrome respectively. Acute glomerulonephritis was not the commonest cause of renal disease in other studies at the same time frame.[2] The common cause of renal disease in that study was acute kidney injury (AKI) and UTI, the third being acute glomerulonephritis. This might be because most cases of AKI in our setting had to be referred to other centers due to the unavailability of dialysis and as previously mentioned most cases of simple UTI were not kept under regular follow up in the nephrology clinic which might have decreased the case burden of these two diseases. The decrease in the number of CAKUT over the study period could be due to the changes in the guidelines to perform MCUG in UTI.[20]

Conclusion

Over the 10-y period (2008-18) we found a decrease in the number of children with renal diseases visiting the nephrology clinic and a change in the pattern of diagnosis from congenital anomalies of the kidney and urinary tracts (CAKUT) to acute glomerulonephritis and nephrotic syndrome. The younger age group mostly presents with CAKUT while children >5 y presented with acquired diseases.

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Conflict of Interest

None

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None

Author Contribution

Concept, design, planning: ALL (PK, MFA, SD, AK); Literature review: PK, MFA; Data collection/analysis: PK, SD, AK; Draft manuscript: ALL; Revision of draft: ALL; Final manuscript: ALL; Accountability of the work: ALL.

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