

Spectrum of Biopsy Proven Glomerular Disease in Children at Kanti Children's Hospital

Khatun N¹, Bista KP², Mahaseth C³

Abstract

Introduction: Glomerular disease is one of the most common forms of renal disease and can have many different clinical presentations. However there is variation in the prevalence in the type of glomerular disease according to geographical location and race of population. The aim of the study was to find the overall distribution pattern of glomerular disease based on renal biopsies. **Material and Methods:** The medical records of all children who underwent kidney biopsy (n=29) between January 2012-june 2014 were analyzed. In this retrospective study we review children from Kanti Children's Hospital, Nephrology Department. Demographic data including age, sex and indication of kidney biopsy as well as complication of the procedures were recorded. **Result:** A total number of thirty one biopsies were done. Two children were excluded from the study due to inadequate tissue and artifacts defects in preservative. The remaining twenty nine biopsies were included in the study and analyzed. Renal disease was found nearly equal in both male and female (51.72% vs. 48.27%). Mean age was 10.95±3.30 years. Maximum number of biopsies (75.86%) was performed between 10- 15 years. The most common indication of the kidney biopsy was nephrotic syndrome (steroid resistant nephrotic syndrome and steroid dependent nephrotic syndrome, 31.02% followed by lupus nephritis 27.58%. The most common glomerular disease were focal segmental glomerulosclerosis and lupus nephritis both contribute 27.58%. Among lupus nephritis class III was found more common (44.44%) in children. IgA nephropathy was also contribute (17.24%) in all glomerular disease. Regarding the kidney biopsy complication gross hematuria was observed in 6.89% of children which was self-limited. **Conclusion:** FSGS and lupus nephritis is becoming the most common glomerular disease in children attending the Kanti Children Hospital. IgA nephropathy was also contribute the glomerular disease in the children.

Key words: Complication, Glomerulonephritis, Kidney biopsy, Nephrotic syndrome

Introduction

Kidney biopsy in the pediatric age group as in the adult population is one of the most important investigation in renal medicine.

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How to cite

Khatun N, Bista KP, Mahaseth C. Spectrum of Biopsy Proven Glomerular Disease in Children at Kanti Children's Hospital. J Nepal Paediatr Soc 2014;34(3):225-229.

doi: <http://dx.doi.org/10.3126/jnps.v34i3.11162>

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In children the rate of undergoing kidney biopsy is not more than 10% as compared to adult¹. Since the introduction of percutaneous renal biopsy (PRB) in 1950's, technical advances in imaging and biopsy needle have simplified and improve the success of the procedures. Though PRB is generally considered a safe but it is more difficult in children than adults due to size variation and different level of cooperation^{2,3,4}. It can provide diagnostic precision, especially in glomerular disease, and also provides important information of prognostic value and about treatment option⁵. However, there is a variation in the prevalence of the types of glomerular

disease according to geographical location and race of the population⁶. Glomerular disease is one of the most common forms of renal disease and can have many different clinical presentation. Glomerular diseases continue to be the leading causes of end stage renal disease globally^{6,7}. There is only few published data regarding the frequency of different glomerulonephritis in Nepalese children in renal biopsies. Therefore, this was conducted to observe the spectrum of glomerular disease in children attending the Kanti Children’s Hospitals.

Materials and Methods

All the kidney biopsies that were performed in Kanti Children’s Hospital, Nephrology Department over a period of two and half year from January 2012 to June 2014 were retrospectively analyzed. A total thirty one biopsies were done. Two cases of renal biopsies were excluded from the analysis due to inadequate tissue and artifacts defect in preservative. Finally twenty nine biopsies were analyzed.

Demographic data including age, sex, as well as indication of kidney biopsy, the histopathological diagnosis and complications of the procedure were recorded.

Biopsies were done under midazolam premedication, using Bard Disposable Core biopsy 18 G. Smaller children less than five years, biopsies were done under ultrasound guidance and children more than five years biopsies were done after ultrasound guidance surface marking. Two specimens were taken for light microscope and for immunohistochemistry. All our biopsies were done as an inpatient procedure and patients were observed for twenty four hours after the procedure.

Each biopsy specimen was stained with hemotoxyline and eosine (H and E), periodic acid Schiff (PAS), silver methenamine, congo red. IgA, IgM, IgG,

C3, C1q, kappa and lambda light chain were tested by direct immunofluorescence.

Nephrotic syndrome was defined as clinical triad of heavy proteinuria (24 hours urine protein 40 mg/m²/hour or 2mg/mg), hypoalbuminemia and generalized edema. Steroid resistant nephrotic syndrome was defined as persistent proteinuria of more than 40 mg/m²/hour after 8 weeks of daily dose of prednisolone therapy. Steroid dependent nephrotic syndrome is defined as relapse while on alternate day steroid therapy or within 21 days of completing a successful course of prednisolone therapy.

Results

Over two and half year period, thirty one biopsies were performed, and two cases were excluded. Finally twenty nine biopsies were analyzed. Where male (n=14) and female (n=15) were nearly equal. Mean age was 10.95(±3.30) years, ranging from 22 months to 14 years. Among these 6.89% were aged under 5 years, 17.24% were 6-10 years and 75.86% were 11-14 years (Figure 1). FSGS, IgA nephropathy, lupus nephritis were more common between 10-14 years (Table 2).

The most common indication for renal biopsy was nephrotic syndrome 31.02%, among SRNS and SDNS was 24.13% and 6.89% respectively. Suspected lupus nephritis was second most common indication for biopsy (Table 1).

The most common glomerular disease was focal segmental glomerulosclerosis (FSGS) and lupus nephritis (27.58%). Among the lupus nephritis class III was the most common glomerular disease in children followed by class IV. IgA nephropathy was found 17.24% (Table 3). None of the biopsies shows minimal changes nephrotic syndrome. Following the procedures 6.89% patients developed gross hematuria which was self-limited (Table 4).

Table 1: Indication for kidney biopsy:

Indication	Number (n=29)	Percentage (%)
Nephrotic syndrome		
Steroid resistant nephrotic syndrome (SRNS)	7	24.13
Steroid dependent nephrotic syndrome (SDNS)	2	6.89
Recurrent gross hematuria	2	6.89
Persistent hematuria	0	0
Suspected lupus nephritis	8	27.58
Henoch schönlein purpura with nephrotic range proteinuria	2	6.89
Systemic disease with nephrotic range proteinuria	1	3.44
Rapid deterioration of renal function	2	6.89
Nephrotic range proteinuria with hematuria	5	17

Table 2: Histopathological diagnosis of children according to age category:

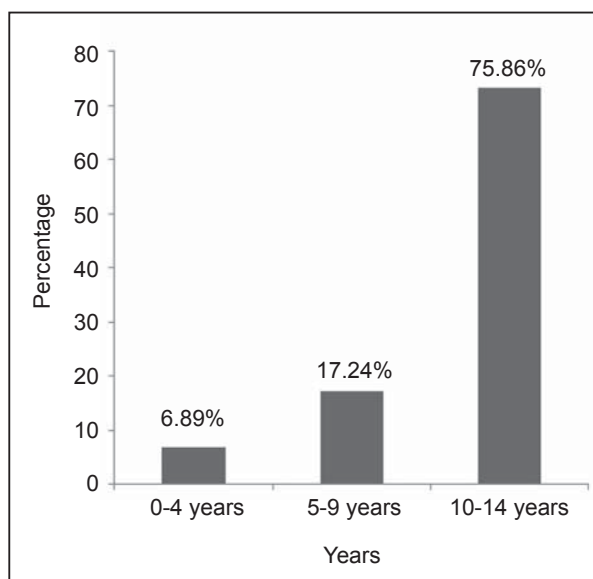
	0-4 years	5-9 years	10-14 years
Minimal change nephrotic syndrome	0	0	0
Focal segmental glomerulosclerosis	1	2	5
Mesangiocapillary glomerulonephritis	0	0	1
Diffuse proliferative glomerulonephritis	0	1	1
IgA nephropathy	0	0	5
Henoch schonlein glomerulonephritis	0	0	2
Lupus nephritis	0	1	7
Non immune complex mediated glomerulopathy	0	1	0
Post infectious	0	0	1
Non specific	1	0	0

Table 3: Distribution of Glomerular Diseases

Glomerular Diseases	Number (n=29)	Percentage (%)
Minimal change nephrotic syndrome	0	0
Focal segmental glomerulosclerosis	8	27.58
Mesangiocapillary glomerulonephritis	1	3.44
Diffuse proliferative glomerulonephritis	2	6.89
IgA nephropathy	5	17.24
Henoch Schönlein Purpura	2	6.89
Post infectious glomerulonephritis	1	3.44
Lupus nephritis	8	27.58
Class I	0	
Class II	0	
Class III	4/8	
Class IV	3/8	
Class V	0	
Class III and V	1/8	
Non immune complex mediated glomerulopathy	1	3.44
Non specific	1	3.44

Table 4: Procedure Complication

Biopsy Complication	Number (n)	Percentage (%)
Microscopic hematuria	0	0
Gross hematuria	2	6.89
Perinephric hematoma	0	0
AV fistula	0	0
Infection at biopsy site	0	0



Discussion

The study provides the spectrum of glomerular disease in children attending the Nephrology Department at Kanti Children's Hospital. In the present study, biopsy was done nearly equal in male and female. Study from Jordan shows requirement of biopsy was more common in male but female were more in Australia^{1,6}.

The maximum numbers (75.86%) of biopsies are performed at 10-14 years of age. Printza et al. also mentioned maximum numbers of biopsies were performed at 11-14 years (48%)². This is because clinically up to age 10 years we treated as minimal change nephrotic syndrome and biopsy was not regularly performed. The most common indication for biopsy at our center was nephrotic syndrome (SRNS and SDNS) followed by suspected lupus nephritis. Nephrotic syndrome was the most frequent indication for renal biopsy in United Kingdom (22.4%), Serbia as well as in India^{4,6,9}. In our country nephrotic syndrome was also common indication for renal biopsy (81.6%) in adult¹². Similar study done by Edward et al. shows nephrotic syndrome (SRNS and SDNS) was common indication for children and adult. However, SRNS and minimal changes nephrotic syndrome was common indication of biopsy shown by Pralad and Viswanath^{1,12,13}.

In our study FSGS (27.58%) and lupus nephritis (27.58%) were the most common glomerular disease in children. The change in the spectrum of the glomerular diseases in the last few decades has been demonstrated in many studied worldwide with most showing a trend towards increase in FSGS cases⁸. Also in adult population

FSGS is more common in India (80%), Nepal (81.6%), Bangladesh (20.41%)^{6,10,11}. Various study shown that minimal changes disease (MCD) are the most common form of nephrotic syndrome in children¹². However this could be explained by the fact that those children with clinical and laboratory evidences of MCD were not subjected to kidney biopsy. Also in our study none of the children with MCD were included for renal biopsy. Golay et al. mentioned lupus nephritis was most common secondary glomerulonephritis (73.38%) and uniformly the commonest causes of of secondary glomerulonephritis worldwide⁷.

In our study among 27.58% of lupus nephritis, class III corresponds to 44.44% followed by class IV but it was more common in eastern Nepal¹³. This variation is due to different geographical region and race of the population. In the present study, IgA nephropathy was found 17.24% in studied children but this is not consistent with the study done at Dharan, where IgA nephropathy was not reported. Golay et al. also mentioned prevalence of IgA nephropathy is much lower in Nepal^{7,11}. This discrepancy may be due to fact that Kanti Children's Hospital is only pediatrics tertiary referral hospital and lack of published data in Nepal. Report from the Italian national registry of renal biopsies in children idiopathic IgA nephropathy was found most common (18.8%)⁹. Among the adult population IgA nephropathy was found 2.9% in Nepal¹¹.

Following the procedure 6.89% children has developed gross hematuria. Our study is not consistent with the study done at Jordan (13.8%) and India (16.8%), which was nearly two times higher than our study^{1,14}. This difference is may be due to simplified biopsy needle and ultra sound guidance biopsy in younger children. William et al. mentioned gross hematuria occurs in 3.1% in adult³.

Conclusion

The most common indication for the renal biopsy is nephrotic syndrome and suspected lupus nephritis. FSGS and lupus nephritis is becoming the most common glomerular disease in children attending the Kanti Children's Hospital. IgA nephropathy is also contributing the glomerular disease in children. The procedure is proved to be safe.

Recommendation

National registries for paediatric kidney biopsy should be established from hospitals of different region of Nepal.

Acknowledgement: We would like to thank, Dr. Hensen Khadka, Dr. Prasant Khatiwada, and Dr. Bhawani Yadav, radiologist in Kanti Children's Hospital who helps us in ultrasound guided kidney biopsy and surface marking.

Funding: Nil

Conflict of Interest: None

Permission from IRB: Yes

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