Original Article

Renal Biopsies

Histopthological Spectrum of Renal Biopsies in Pediatric Population: An Update

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ABSTRACT

Objective: To determine the histological spectrum and indications of renal biopsies in pediatric population from birth to 16 year of age and to delineate any change in histological pattern with time and age at tertiary care hospital in Karachi

Study Design: Cross sectional study

Place and Duration of Study: This study was carried out at Aga khan University Hospital Karachi over a period of 7.5 years from January 2006 to July 2014.

Materials and Methods: A retrospective review of the computerized database of the histopathology department of Aga khan University hospital (AKUH) was carried out on children from birth to 16 years of age who underwent renal biopsy. All renal biopsy specimens were processed, cut and stained and evaluated under light microscopy and immune fluorescence technique. The indication and findings of these biopsies and demographic data such as age and sex were identified. Frequencies and percentages were used for categorical variables and mean ± standard deviation for quantitative variables. SPSS version 19.0 for statistical analysis.

Results: Mean age was 11.5 years ± 3.5years with an age range from 3 months to 16 years with majority of the patients over 10 years of age. Out of 128 patients 79(61.7%) were male and 49(38.3%) were female with a ratio of 1.6: 1.The most common indication observed for renal biopsy was Nephrotic syndrome seen in 75(58.6%) cases with 36 (28.1%) being steroid resistant variety followed by steroid sensitive 25 (19.5 %). Other indications observed were Nephritic syndrome 16 (12.5%), renal failure 13(10.2%) and lupus nephritis for classification 11(8.6%). The most frequent renal disease observed was focal segmental glomerulosclerosis (FSGS) 38(29.7%). Others being minimal change disease 19(14.8%), membranous glomerulonephritis 12 (9.4%). The most frequent biopsyfinding in all age group was FSGS.

Conclusion: The distribution of renal diseases in pediatric age group described is similar to that described in national and international literature with some differencesobserved.This study provides updated epidemiological information on childhood renal diseases.

Key Words: Indication, Biopsy, Children, Nephrotic Syndrome, Focal Segmental Glomerulosclerosis

INTRODUCTION

Pediatric Nephrology is a budding field in the developing world, its data on the pattern and prevalence of renal diseases being scarce[1].Histological examination of renal biopsy is fundamental in establishing the clinical diagnosis, rendering renal biopsy the gold standard procedure. Renal biopsy not only determines the histological pattern of renal disease but also guides treatment and prognosis[2,3]. The data on pediatric renal biopsies remains insufficient; the paucity is attributed to the assumption that nephrotic syndrome in children is almost always Minimal Change Disease (MCD) and hence, steroid therapy is institutedon clinical grounds[4,5]. Also, the renalbiopsy in pediatric group is more demanding than the adult counterpart owing to the expertise required for handling apprehensive children and concerned parents[2].Hence, only 10% of children who are candidates for a renal biopsy actually undergo this invasive procedure. [6,7]

Children are predisposed to a heterogeneous group of renal diseases[6,8]. The pattern of renal diseases varies from one geographical region to another. Genetic predisposition, environmental background and the level of awareness about the diseases are some factors that influence this variability.[9] There are few local data on the histopathological spectrum of renal diseases in pediatric population.[10] However, the data that is available on disease prevalence is insufficient , owing to incomplete hospital records and unreported renal biopsies.[9] This study was undertaken to determine whether any change has occurred in the spectrum of renal diseases and indications for biopsies over a period of 7.5 years at a tertiary care hospital in Pakistan.

MATERIALS AND METHODS

A retrospective review of the computerized database of the histopathology department of Aga khan university hospital (AKUH) was carried out on children from birth to 16 years of age who underwent renal biopsy between January 2006 to June 2014. All renal biopsy specimens were processed, cut and stained and evaluated under light microscopy and immunofluorescence technique. Biopsies were stained with hematoxylin-eosin and periodic acid Schiff. Immunofluorescence staining was

done with antibodies against IgG, IgM, IgA, C3 and C1q.

The indications of these biopsies and demographic data such as age, sex were identified. We excluded biopsies of kidney transplant patients, tumor or those with inconclusive results.

Frequencies and percentages were used for categorical variables and mean ± standard deviation.For descriptive purposes and identification the cases were subdivided further according to patient's age into subgroups. Data was reported in tabulated and graphical format. SPSS version 19.0 for statistical analysis.

RESULTS

Total 161 biopsies were included in the initial analysis of which 33 were excluded for remaining analysis. Mean age was 11.5 years ± 3.5years with an age range from 3 months to 16 years with majority of cases over 10 years of age. Out of 128patients 79(61.7%) were male and 49(38.3%) were female with a ratio of 1.6: 1 (Table 1).

Table No.1: Demographics of patients.

Age n =128	
Mean Age Range	11.5 yrs± 3.5yrs 3months – 16 yrs
Sub-classification according to age **n (%)**	
0-5years >5 to 10 years >10 to 16 years	9 (7.0%) 38 (29.7%) 81 (63.3%)
Gender n (%)	
Male Female Male to Female ratio	79(61.7%) 49(38.3%) 1.6 : 1

Table No.2: Indications of renal biopsy

Sr. No.	**Indication**	**n=128(%)**
1	Nephrotic Syndrome • Steroid Resistant • Steroid responder • Steroid Dependent • Relapsed	75 (58.6%) 36 (28.1%) 25 (19.5%) 10 (7.8%) 04 (3.1%)
2	Nephritic Syndrome	16 (12.5%)
3	Renal Failure	13(10.2%)
5	Lupus nephritis for classification	11(8.6%)
6	Hypertension	3 (2.3%)
7	Hematuria + proteinuria	4 (3.1%)
8	Hematuria	6(4.7%)

The most common indication observed for renal biopsy was Nephrotic syndrome seen in75(58.6%) cases with 36 (28.1%)being steroid resistant variety followed by steroid sensitive25 (19.5 %). Other indications observed were Nephritic syndrome 16 (12.5%), renal failure 13(10.2%) and lupus nephritis for classification 11(8.6%) (Table2) .The most common indication in all age groups of renal biopsy was nephrotic syndrome (Figure 1).

The most frequent renal disease observed was focal segmental glomerulosclerosis (FSGS) found in 38(29.7%) cases. Others being minimal change disease (MCD)19(14.8%), membranous glomerulonephritis (MGN)12 (9.4%). 1 patient was observed to have congenital nephrotic syndrome (0.7%)(Table 3). The most frequent biopsy finding in all age group was FSGS (Figure 2).

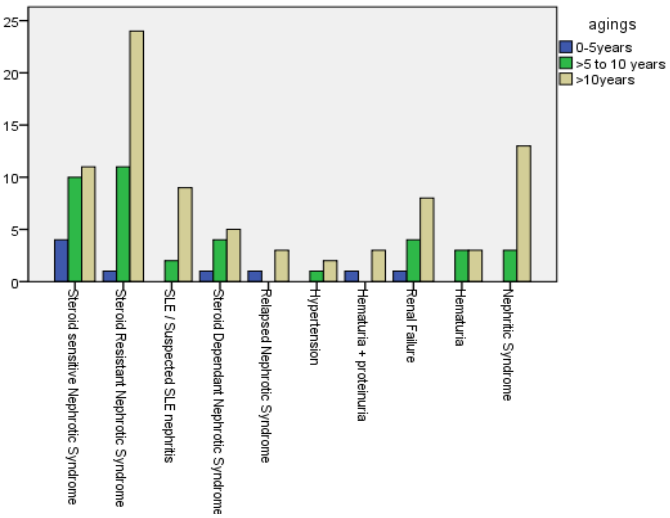

Figure No.1: Indications of renal biopsy in different age-groups

Table No.3: Spectrum of renal diseases in pediatric population.

S. No	**Biopsy Findings**	**n =128(%)**
1	Focal segmental glomerulosclerosis (FSGS)	38(29.7%)
2	Minimal Change Disease (MCD)	19(14.8%)
3	Membranous glomerulonephritis (MGN)	12(9.4%)
4	Crescentic glomerulonephritis (CrGN)	9(7.0%)
5	Lupus nephritis	9(7.0%)
6	Post infectious glomerulonephritis (PIGN)	9(7.0%)
7	Tubulointerstitial nephritis (TIN)	7(5.5%)
8	Membranoproliferative glomerulonephritis (MPGN)	6(4.7%)
9	Amyloidosis	5(3.9%)
10	Mesangioproliferative glomerulonephritis (MesPGN)	5(3.9%)
11	Focal proliferative Glomerulonephritis	4(3.1%)
12	Chronic glomerulonephritis (CGN)	3(2.3%)
13	Congenital nephrotic syndrome	1(0.7%)
14	IgA nephropathy	1(0.8%)

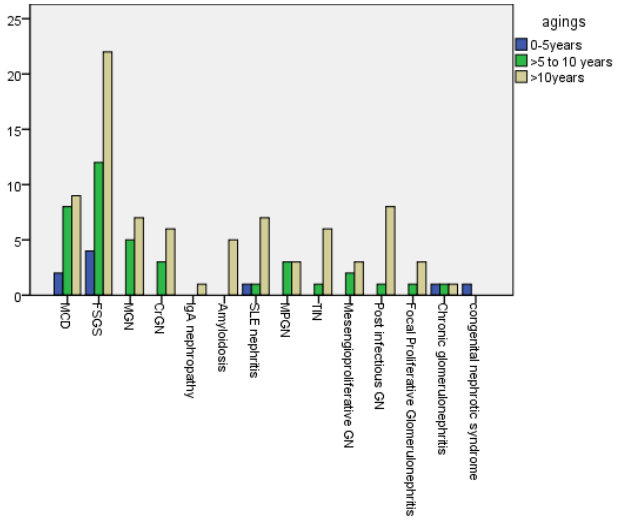

Figure No.2: Renal Diseases in different age groups

DISCUSSION

This study provides an insight into the frequency of biopsy proven renal diseases in the pediatric age group in Pakistan. With the absence of a national registry such reports become more valuable. Although the general pattern of renal diseases observed in this study matches with that reported in developing and developed countries, there are some differences worth acknowledging.

In our series of patients mean age was 11.5 years ± 3.5years with an age range from 3 months to 16 years with majority over 10 years of age. It was in approximate to a research work done in Nigeria[9] and a national study from Pakistan[15]. In contrast a study in Jordon[7] and a local series showed a mean age of 7.5 years[11].Several International studieshave also reported a greater frequency of children over 10 year of age[2,10,11], while a study from Portugal reported a greater frequency of children under 10 years[13]

In our group of 128 patients 79(61.7%) were male and 49(38.3%) were female with a ratio of 1.6: 1. Similar percentages were observed in a study by Isaac et al and some other series around the world[2,7,9]. In comparison a greater proportion of females were observed in few international studies[13,14]. A review data from Saudi Arabia showed an equal proportion of males and females with a ratio of 1:1[10], whereas a higher proportion of males were observed in a local literature report. [11]

The most common indication for renal biopsy in this study was Nephrotic syndrome accounting for 75 (58.6%) cases; with steroid resistant variant the most frequent (28.1 %). This was similar to a study by Edward et al[7]. With few exceptions (9), majority of the data published worldwide showed nephrotic syndrome as the most common indicator for renal biopsy in pediatric population. [1,2,11,13-18,19,20].

In our study nephritic syndrome was seen in 12.5% of the cases. Similar frequency was seen in a study done in Saudi Arabia[10]. In contrary to a local study where only 6.5% of the patients who underwent renal biopsy had nephritic syndrome[15]. In a report by Edward Saca nephritic syndrome was seen in 8.6% of the cases as an indication for biopsy in children[7].

The most frequent disease in our research work was FSGS (29.7%). Almost similar frequency was reported by Dusan et al[14] and Edward et al[7].The incidence of this renal disease is on the rise in both adults in children presenting with nephrotic syndrome in most part of the world. This is in contrast some national and international studies which reported MCD being the most frequent biopsy finding in pediatric age group[2,11,15,16,21].

In our study MGN and MPGN are seen in 9.4% and 4.7% of the patients respectively. A similar frequency of 9% of MGN in children was reported by Habib et al[23]. The diagnostic yield of MGN has increased due to the use of immunofluorescence technique. In a study by Kumar et al MPGN was found to be in greater patients when compared to our study[24] whereas similar frequency was seen in another study on Indian children[25].

Nine percent of both Crescentic GN and lupus nephritis was observed in our study in comparison to others where a lower prevalence of each of them was noted[2,7,15].

The frequency of PIGN in the present work was 7%. In one international study 9.5% of the pediatric population who underwent kidney biopsy had this finding[22], where as a local study reported its frequency to be 10.6%[2]. Its frequency was much lower in another international study where it was seen in only 3.3% of the children[10]. Post infectious GN is usually diagnosed on clinical grounds and no biopsy is required, however certain cases are presented with nephrotic syndrome. Therefore renal biopsy is required to exclude other causes.

In our study subjects MesPGN was seen in 3.9% of the cases. Jalah and Jamal observed a frequency of 5.9% which was in close approximation to that seen in our study[22]. In one local research work it was found in 17.83 percent of the patients[2]. In another international study its prevalence was seen to be much higher[7]. The lower frequency of MesPGN in our cases was mainly due correlation of this histological pattern with clinical features, serology and immune fluorescence technique to reach an appropriate clinical diagnosis.

Data collected in this study together with previously reported data should be a basis for a future national pediatric renal biopsy registry.

CONCLUSION

The indication of renal biopsies and histological spectrumhave not changed much with time. However some differences observed in our study that are an

increase frequency of steroid resistant variant of nephrotic syndrome and FSGS being the most common biopsy finding and most common renal disease in all age groups. Therefore this study provide a valuable contribution in the epidemiology of pediatric renal diseases in our region.

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