ORIGINAL ARTICLE

A PROSPECTIVE STUDY OF NEPHROTIC SYNDROME IN CHILDREN

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ABSTRACT: AIM OF THE STUDY: To study the incidence, age and sex related demographics in children with Nephrotic Syndrome (NS) and to find the aetiology in atypical cases of NS by renal biopsy. **MATERIALS AND METHODS:** The present study was a single centre, descriptive, prospective and observational cross sectional study. All patients who were admitted in the department of paediatrics with Nephrotic syndrome during the study period of 2 years from July 2010 to June 2012 were included. The demographics and renal biopsy results were analysed further. **RESULTS:** Total number of cases of NS was 44 against total Paediatric admissions of 4827. Incidence of NS was 0.91% (44/4827) among all paediatric admissions. Male to female ratio was 2.14:1. Majority of NS cases were 3-5 years old (36.36%, n=44), followed by 5-7 years (29.55%, n=44), 7-9 years (18.18%, n=44) and 1-3 years (15.91%, n=44). Total number of renal biopsies done was 18, out of which 14 (77.78%, n=18) had minimal change disease (MCNS) and 3 (16.67%, n=18) had Focal Segmental Glomerulosclerosis (FSGS) and 1 (5.55%, n=18) had anti Glomerular Basement Membrane disease. **CONCLUSION:** The incidence of Nephrotic syndrome in children was 0.91% (44/4827) among total paediatric admissions, had male preponderance with ratio of males to females of 2.14:1, most commonly affecting children of 3 -5 years of age and the most common aetiology being Minimal Change Disease (MCD).

KEYWORDS: Nephrotic syndrome, children, renal biopsy, Minimal Change Disease, Focal Segmental Glomerulosclerosis, Glomerular Basement Membrane disease.

INTRODUCTION: Nephrotic syndrome (NS) is primarily a paediatric disorder and is 15 times more common in children than adults. Estimates on the annual incidence of nephrotic syndrome range from 2-7 per 100,000 children, and prevalence from 12-16 per 100,000.[1]

Nephrotic syndrome is a common chronic disorder, characterized by alterations of perm selectivity at the glomerular capillary wall, resulting in its inability to restrict the urinary loss of protein. Nephrotic range proteinuria is defined as proteinuria exceeding 1000 mg/m² per day or spot (random) urinary protein-to creatinine ratio exceeding 2 mg/mg. The proteinuria in childhood nephrotic syndrome is relatively selective, constituted primarily by albumin.[1]

Proteinuria in children with idiopathic nephrotic syndrome is secondary to a loss of charge selectivity of the glomerular basement membrane. Loss of anionic charges may be secondary to a defect of heparan sulfate proteoglycans, which is also found in the congenital nephrotic syndrome, or to cationic proteins, which neutralize the anionic charges of the membrane.[1] Reports on recurrence of nephrotic syndrome in patients with steroid-resistant idiopathic nephrotic syndrome following renal transplantation suggest that a humoral factor, possibly produced by T lymphocytes, may enhance glomerular permeability. Corticosteroids remain the basic treatment of idiopathic nephrotic syndrome. Most patients respond to steroid therapy and a

high proportion of them relapses but continues to respond throughout the subsequent course of the disease.[2,3] Levamisole may be effective in preventing relapses. Cyclosporine may be useful in steroid-dependent patients with signs of steroid toxicity and after a failure of a course of alkylating agent.[4,5,6] Almost 85% of patients respond to cyclosporine, but they relapse after tapering or stopping the drug. In steroid-resistant patients, there is no study showing a clear-cut beneficial effect of alkylating agents, as the remission rate after treatment is close to the rate of spontaneous remission. Cyclosporine in association with prednisone may be effective, but the risk of nephrotoxicity seems to be higher than in steroid-dependent patients.[6,7,8]

MATERIALS & METHODS:

Study Design: The present study was a single centre, descriptive, prospective and observational cross sectional study.

Sample Size: Over a span of 2 years from July 2010 to June 2012, 44 cases of NS were included who had nephrotic range proteinuria, edema and hypoalbuminemia.

Method of Collection of Data: The data for the purpose of the study was collected in a predesigned and pretested proforma which included various socioeconomic parameters like age, sex, occupation, religion and socioeconomic class. About 44 cases were selected on the basis of the simple random sampling method. Children who had nephrotic range proteinuria, edema and hypoalbuminemia were included. The statistical data was analyzed with the help of software SPSS.16.0, Chi-square test was done. Questionnaires, appropriate blood and urine investigations, detailed physical examination and radiographic examination was done in all patients. Renal biopsy was done in patients with atypical presentation and whose parents accepted for the same.

INCLUSION CRITERIA:

1. Patients fulfilling all the diagnostic criteria of NS that is Nephrotic range proteinuria, oedema and hypoalbuminemia.
2. From birth to 12 years.

EXCLUSION CRITERIA:

1. Patients older than 12 yrs.
2. Children who were previously treated for nephrotic syndrome.

RESULTS: Total number of cases of NS was 44 against total Paediatric admissions of 4827. The rate was 0.91% (44/4827). Male to female ratio was 2.14:1 (Table 1).

Group	Number of patients (n=44)	Percentage
Males	30	68.18%
Females	14	31.82%
Total	**44**	**100**

Table 1: Distribution of patients according to sex (n=44)

Majority of NS cases were 3-5 years old (36.36%, n=44), followed by 5-7 years (29.55%, n=44), 7-9 years (18.18%, n=44) and 1- 3 years (15.91%, n=44) (Table 2).

Age groups (years)	Number of patients (n=44)	Percentage
1-3	7	15.91%
3-5	16	36.36%
5-7	13	29.55%
7-9	8	18.18%
Total	**44**	**100**

Table 2: Distribution of patients according to age groups (n=44)

Total number of renal biopsies done was 18, out of which 14(77.78%, n=18) had minimal change NS (MCNS) and 3(16.67%, n=18) had Focal Segmental Glomerulosclerosis (FSGS) and 1(5.55%, n=18) had anti Glomerular Basement Membrane disease (Table 3).

Renal biopsy finding	Number (n=18)	Percentage
MCD	14	77.78%
FSGS	3	16.67%
Anti-GBM	1	5.55%
Total	**18**	**100**

Table 3: Renal biopsy findings (n=18)

DISCUSSION: Estimates on the annual incidence of nephrotic syndrome range from 2-7 per 100,000 children, and prevalence from 12-16 per 100,000.[1] There is epidemiological evidence of a higher incidence of nephrotic syndrome in children from south Asia.[2] The condition is primary (idiopathic) in 95 per cent cases. An underlying disorder that might be identified in less than 5 per cent cases, includes systemic lupus erythematosus, Henoch Schonlein purpura, amyloidosis and infection with HIV, parvovirus B19 and hepatitis B and C viruses.[1,3,4] The present study has compared the rate with other paediatric patients rather than whole population.

The ISKDC found that 76.6% of children with INS had MCNS on kidney biopsy findings, with 7% of cases associated with FSGS on biopsy findings.[9,7] Our study had similar prevalence of MCD. The remaining is contributed by focal segmental glomerulosclerosis (FSGS) and mesangioproliferative glomerulonephritis (MesPGN). Some studies have suggested a change in the histology of INS over the past few decades, although the overall incidence of INS has remained stable. The frequency of FSGS associated with INS appears to be increasing. A review of the literature suggested a 2-fold increase in the incidence of FSGS in recent decades.[10] However, another study found no evidence of an increasing incidence of FSGS.[11] MCD and FSGS are often considered to represent the same pathophysiological process. Membranoproliferative glomerulonephritis and membranous nephropathy are uncommon conditions in childhood.

The unique finding in our study was one child having MCD at light microscopic study when he was subjected to Immunofluorescence because there was a suspicion of C1q nephropathy, as this was inconclusive the sample was subjected to Electron Microscopic study which show splitting of the basement membrane, further evaluations showed the child had Anti-GBM disease.

In children younger than 8 years at onset, the ratio of males to females varies from 2:1 to 3:2 in various studies. In older children, adolescents, and adults, the male-to-female prevalence

is approximately equal. ISKDC data indicate that 66% of patients with either MCNS or FSGS are male, whereas 65% of individuals with MPGN are female. Of patients with MCNS, 70% are younger than 5 years. Only 20-30% of adolescents with INS have MCNS on biopsy findings. In the first year of life, genetic forms of INS and secondary nephrotic syndrome due to congenital infection predominate.[1] The present study has similar ratio of males to females and about 66% of cases belonged to 3-7 years age group.

Our study has used a small group to study the common presentation of nephrotic syndrome and the histological diagnosis, this study has impartially shown the prevalence of MCD has the most common cause for nephrotic range proteinuria in children. Further randomization and further large scale studies can enlighten further about various other spectrum of nephrotic syndrome prevalent in childhood.

CONCLUSION: The incidence of Nephrotic syndrome in children was 0.91% (44/4827) among total paediatric admissions, had male preponderance with ratio of males to females of 2.14:1, most commonly affecting children of 3 -5 years of age and the most common aetiology being Minimal Change Disease (MCD).

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ORIGINAL ARTICLE

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