



**Clinico-epidemiological profile of Nephrotic Syndrome in Children below 12 year of age - A prospective cohort study from North Western India**

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**Abstract**

**Background:** Nephrotic syndrome (NS) is primarily a pediatric disorder and is 15 times more common in children than adults. It is a common renal disease that is characterized by episodes of relapses and remissions, with variations in the outcome. It is an important cause of chronic renal disease in children.

**Objective:** To study the clinical presentation, investigation profile, associated factors, and therapeutic response in children with Nephrotic syndrome in children below 12 year of age.

**Materials and Methods:** This prospective observational study was conducted from January 2020 to December 2020 in the department of Pediatrics of a tertiary care institution of north India. A total of 60 children diagnosed with NS were included in the study. Detailed information on age, sex, age at first episode, presenting

complaint, history of presenting illness, social, and family history was taken. Detailed general physical examination, systemic examination, investigation profile, and response to management were recorded on a proforma and analysed statistically.

**Results:** Out of 60 cases of NS, the most common age group was 5–10 years (60%). There were 34 (56.6%) males and 26 (43.3%) females with a male-to-female ratio of 1.3:1. It was found that 45 (75%) subjects were newly diagnosed and 15 (25%) were relapse cases. Edema and facial puffiness were most common presenting complaints. Most common signs were pitting pedal edema (95%) followed by ascites (71%), pallor (56%), pleural effusion (21%), hypertension (16%), hematuria (16%) and hepatomegaly (8%). Urinary tract infection (UTI) was most common associated (30%)

factor. A total of 57 (95%) patients were steroid-sensitive and achieved remission.

**Conclusion-** Nephrotic syndrome is more common in male children and mostly before adolescent. First episode is commoner than relapses and commonest presentation is edema and fluid accumulation. UTI is most common associated factor. Most of cases in this age group are steroid sensitive and responded well.

**Keywords** – NS (Nephrotic Syndrome), UTI (Urinary tract Infection), Steroid dependent nephrotic syndrome.

### **Introduction**

Nephrotic syndrome (NS) is primarily a pediatric disorder and is 15 times more common in children than adults. The incidence is 2-3/100,000 children per year; and most affected children will have steroid-sensitive minimal change disease. NS is a multi-factorial clinical condition characterized by increased glomerular permeability with consequent massive proteinuria. NS is usually accompanied by retention of water and sodium. The degree to which this occurs can vary between slight edema in the eyelids, to affecting the lower limbs, to generalized swelling, anasarca.<sup>1</sup> NS is the clinical manifestation of glomerular disease associated with massive (nephrotic range) proteinuria, hypoalbuminemia (<2.5g/dl), generalized edema, and hyperlipidemia (cholesterol >200mg/dl). Nephrotic range proteinuria is defined as proteinuria >1g/m<sup>2</sup> /24 hours or >40mg/m<sup>2</sup> /hours.<sup>2</sup> The characteristics of NS is determined by several factors including environmental factors, ethnic origin and infection leading to variability in the histological expression of the disease.<sup>3</sup> The current study describes the clinic-epidemiological profile of the children presenting with nephrotic syndrome at a tertiary center in north-west India.

### **Materials and methods**

This prospective observational hospital-based study was carried out at outpatient and inpatient units of department of Pediatrics of JLN Medical College, Ajmer, Rajasthan, India a tertiary care teaching institute between January 2020 and December 2020. All consecutive children aged between one year and 12 years with newly diagnosed nephrotic syndrome or presenting with relapse of the disease were enrolled after obtaining informed consent. Children with other chronic comorbidities were excluded. Institutional ethics committee approval was obtained. All newly diagnosed cases were admitted as inpatients. Detailed history, thorough general and systemic examination was done. The standard investigations like urine analysis for albumin, hyaline casts and red blood cells, serum protein, serum albumin, blood urea, serum creatinine, Mantoux test, chest radiograph, ultrasonography abdomen, serum lipid profile and urine culture were done. Patients previously diagnosed as nephrotic syndrome with relapse were also admitted.

### **Statistical analysis**

Quantitative data was expressed in mean  $\pm$  standard deviation and differences between two groups were compared using unpaired t test. Qualitative data were expressed in percentage and difference between proportions was tested by chi square test. P value less than 0.05 was considered statistically significant. Statistical package for social sciences version 23 was used for the analysis.

### **Results**

A total of 60 children with nephrotic syndrome were included in the current study. Majority (60%) of patients were in the age group of 5-10 years, followed by 1-5 years (26.6%) (Table 1). The mean age of the population was  $6.67 \pm 3.35$  years.

Table 1: Demographic profile of the patients

Variables	Group	Number (N=60)	Percentage
Age at presentation	1-5 years	16	26.66
	5-10 years	36	60
	11-12 years	8	13.33
Gender	Male	34	56.6
	Female	26	43.3
First episode/relapse	First episode	45	75
	First relapse	3	5
	Second relapse	9	15
	More than 2 relapses	3	5

Male patients outnumbered the female patients (Male=34; 56.6%, Female=26, 43.3%) with Male: Female ratio of 1.3:1. A total of 45 children (75%) presented with first episode of nephrotic syndrome at enrolment. Fifteen children presented with relapse (Nine children with 2 relapse and three children with 1 & 3

relapse each). Edema and facial puffiness were most common presenting complaints which were present universally. This was followed by abdominal distension (83%), urinary complaints (38%), scrotal/labial swelling (28%) and fever (21%) (Figure 1).

Table 2: Presenting symptoms and signs

Presenting symptom and sign	Cases	Percentage
Presenting symptom		
Edema	60	100
Facial Puffiness	60	100
Abdominal Distension	50	83.33
Urinary Complaints	23	38.33
Scrotal swelling/ Labial swelling	26	28.33
Fever	14	21.66
Respiratory Distress	5	8.33
Diarrhoea	5	8.33
Skin Infection	2	3.33
Presenting sign		
Facial Puffiness	60	100
Pedal edema	57	95
Anasarca	46	76.66
Ascites	43	71.66
Pallor	34	56.66

Oliguria	33	56.66
Scrotal edema/Labial edema	27	28.33
Fever	14	23.33
Pleural Effusion	12	21.66
Hypertension	10	16.66
Hepatomegaly	6	8.33

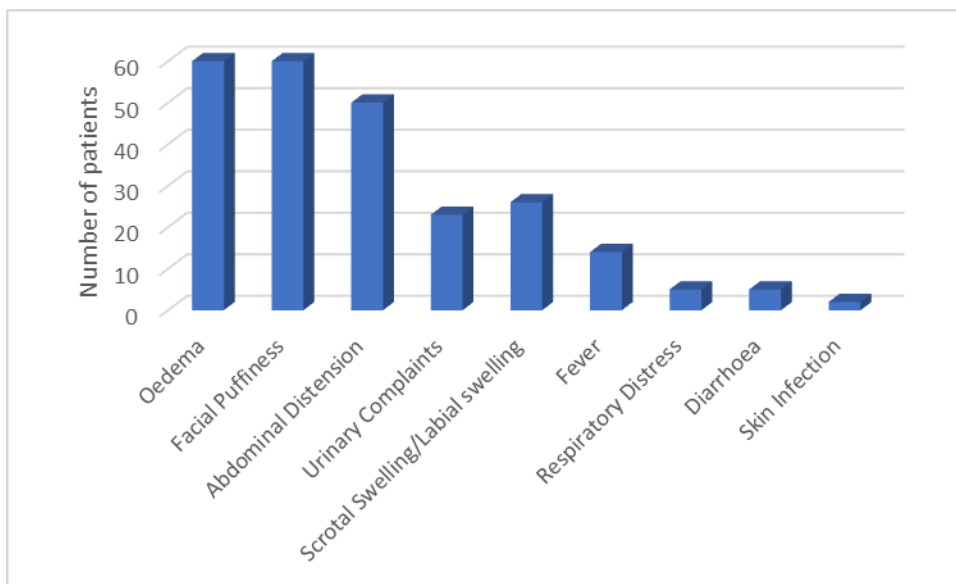


Figure 1: Presenting symptoms/signs

Most common signs were pitting pedal edema (95%) followed by ascites (71%), pallor (56%), pleural effusion (21%), hypertension (16%), hematuria (16%) and hepatomegaly (8%) (Table 2). Urinary tract infection (UTI) was most common associated (30%) factor. Ten

children (16%) had Escherichia coli UTI while eight children (13%) were growing Enterococcus species in urine. Investigation profile of the patients are displayed in table 3. A total of 57 (95%) patients were steroid-sensitive and achieved remission.

Table 3: Investigation profile of study subjects

Investigation profile	Mean±SD
Serum albumin (g/dl)	1.84±0.36
Total cholesterol (mg/dl)	463.53±73.81
Triglyceride (mg/dl)	285.7±74.51
High density lipoprotein (mg/dl)	52.01±8.58
Low density lipoprotein (mg/dl)	277.13±91.06
Very low-density lipoprotein (mg/dl)	66.11±13.66
Hemoglobin (g/dl)	10.7±1.62
Erythrocyte sedimentation rate (mm at end of one hour)	28.8±13.01
Serum creatinine (mg/dl)	0.63±0.23

## Discussion

The current study was conducted to evaluate the clinico-epidemiological profile of nephrotic syndrome in children from a tertiary care center from north-west India. We observed that 26.6% patients were of age less than 5 years. Majority (60%) of patients fall in the age group of 5-10 years. The mean age of the cohort was 6.67 years. In our study out of 60 patients, 56.6% patients were males, and 43.3% patients were females. Krishnamurthy et al found that the most common age group was 6 -10 years (24 cases), followed by 1 to 5 years (12 cases)<sup>4</sup>. Mean age of presentation was 6.9 years like our study cohort. A similar study by Hassan et al reported majority of the children with nephrotic syndrome (60%) in the age group of 2-6 years<sup>5</sup>. The male: female ratio of 1.38 was also comparable to our cohort.

Kabir et al reported male-female ratio of 2.4:1 in children with first episode of nephrotic syndrome while 3:1 in children with relapse. The difference was not statistically significant ( $p > 0.05$ )<sup>6</sup>.

In our study, majority of the children (75%) presented with first episode of NS while 15% patients had two relapses followed by 5% patients had one and three relapse each. Sreenivasa et al reported 75% of the children presenting with first episode of NS like the current study<sup>7</sup>. Kabir et al found that more than half (54.2%) of the patients belonged to age 2-6 years in NS 1st attack group and 9 (64.6%) in NS relapse group and the difference was not statistically significant<sup>6</sup>. We also did not find any significant difference in the age group between first episode NS and relapse.

In our study all patients had generalized edema and facial puffiness followed by abdominal distension in 83% of cases. Urinary complaints were present in 38% of the cases. Around 23% of patients presented with fever

associated with infections such as upper respiratory tract infection, UTI, and pneumonia, and these infections could be triggering factors for relapses in NS. Around half of the patients presented with oliguria which might be due to decreased intravascular volume caused by shifting of fluid from intravascular to extravascular space or might be due to renal failure which was a feature of atypical NS. Hematuria (16%), hypertension (16%), and pleural effusion (21%) were other presenting signs. A similar study by Hassan et al (54) found that generalized edema was present in all cases (100%) and Abdominal distension in 80% of cases. 46% patients had decreased urine output and 30% cases had fever. Pitting edema, ascites, pleural effusion, hepatomegaly, and pallor were common clinical findings. Kusuma et al found that generalized edema (100%), abdominal distension (80%) and decreased urine output (46%) were commonest clinical presentation. Generalized edema (100%), ascites (80%), hepatomegaly (22%) and anemia (8%) were common clinical findings. Respiratory infection (20%) was the most common associated factor<sup>8</sup>. Other associated factors were UTI (18%), cellulites (4%) and pulmonary tuberculosis (2%). In the current study, UTI was the most common associated factor with *Escherichia coli* (16%) and *Enterococcus* species (13%) as the common organisms.

## Conclusion

It can be concluded from our study that nephrotic syndrome most commonly affects the children from the age group 5-10 years. The most common symptom was facial puffiness followed by abdominal distension. Most common signs were pitting pedal edema (95%) followed by ascites (71%), pallor (56%), pleural effusion (21%), hypertension (16%), hematuria (16%) and hepatomegaly (8%). Urinary tract infection (UTI) was most common

associated (30%) factor. A total of 57 (95%) patients were steroid-sensitive and achieved remission.

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