Original Article

Clinical profile and complication of nephrotic syndrome in a tertiary health care center in central India

Avyact Agrawal[1], Ravi Prakash Singh[2]

From [1]Associate Professor, [2]Senior Resident, Department of Pediatrics, Netaji Subhash Chandra Bose Medical College and Hospital, Jabalpur, Madhya Pradesh, India

Correspondence to: Dr. Ravi Prakash Singh, Flat No C-8, S.G. Yash Heights, Sai Colony, Dhanwantari Nagar, Jabalpur - 482 003, Madhya Pradesh, India. E-mail: ravi.prakashsingh789@gmail.com

Received - 07 November 2019 Initial Review - 25 November 2019 Accepted - 22 January 2020

ABSTRACT

Background: Nephrotic syndrome (NS) 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. **Objective:** The objective of the study was to access the clinical presentation, investigation profile, associated complication, and therapeutic response in children with NS. **Materials and Methods:** This prospective observational study was conducted from March 2017 to June 2018 in the department of pediatrics of a tertiary care institution of Central India. A total of 107 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 pro forma and correlated statistically. **Results:** of 107 cases of NS, the most common age group was 5–7 years (54.2%). There were 73 (68.2%) males and 34 (31.7%) females with a male-to-female ratio of 2.1:1. It was found that 39 (36.4%) subjects were newly diagnosed and 68 (63.6%) were relapse cases. A total of 95 (88.8%) patients were steroid-sensitive while 12 (11.2%) had initial steroid resistance NS. **Conclusion:** In our study, clinical presentation and response to treatment in cases with NS did not differ significantly from other studies.

Key words: *Clinical and investigation profile, Complication of nephrotic syndrome, Nephrotic syndrome, Presentation of nephrotic syndrome*

Nephrotic syndrome (NS) is a disease that not only affects the obvious physical health but also affects the family and psychology of the individual. NS is a common chronic disorder, characterized by alterations of the permeability of the glomerular capillary wall, resulting in its inability to restrict the urinary loss of protein. The proteinuria in childhood NS is relatively selective, constituted primarily by albumin. It is characterized by edema, nephrotic range proteinuria (>40 mg/m²/h), hyperlipidemia (hypercholesterolemia), and hypoalbuminemia [1].

During active disease, the loss of proteins required for various biologic functions can result in complications such as infections, thromboembolic incidence, and acute kidney injury (AKI) [2-5]. Nephrotic range proteinuria is said to be present if early morning urine protein is $3^+/4^+$ (heat coagulation test), spot urine protein/creatinine ratio >2, or urine albumin excretion >40 mg/m²/h [6]. The characteristics of the NS presenting in childhood age vary considerably in developing countries compared to the developed countries and are influenced by environmental factors, infection, and ethnic origin, which determine the histological expression of the disease [2].

NS commonly presents with generalized body swelling but can present with complicated form, especially atypical type. Hence, the importance of high clinical suspicion, diagnosis, and management comes into the picture. There is a lack of data on clinical profile and response to management in Central India, so in this study, we assessed the clinical presentation, investigation profile, associated complications, and therapeutic response in children with NS.

MATERIALS AND METHODS

This prospective observational hospital-based study was conducted in the department of pediatrics of a tertiary care center in Central India from March 2017 to June 2018. The study included children aged 1–14 years with newly diagnosed as well as previously diagnosed NS who presented with relapse. The study excluded patients whose parents did not give consent to participate in the study, who presented with comorbidities not related to complications of NS and known cases of steroid-resistant NS (SRNS). Written informed consent from the parents/guardians was obtained at the time of admission. Clearance from the Institutional Ethical Committee was taken before the start of the study. Selection of subjects was done according to the diagnostic criteria of NS with massive proteinuria – urine

dipstick testing >300 mg/dl or 3^+ or >40 mg/m^2/h on a 1-timed sample, hypoalbuminemia (<2.5 g/dl), hypercholesterolemia (total cholesterol >200 mg/dl), and generalized edema [1].

Detailed information on age, sex, age at first episode, and the locality was noted. The presenting complaint, detailed history of presenting illness, diet history, and social and family history were taken. Detailed general physical examination, vitals, anthropometry, and systemic examination were done. Following investigations were done: Urine routine and microscopy for total protein, albumin, red blood cell, casts and pus cell, urine culture, and sensitivity when indicated, serum albumin, globulin, lipid profile, serum cholesterol, serum triglycerides, blood urea, creatinine, serum electrolyte (Na^+, K^+ and Ca_2^+), complete blood count with erythrocyte sedimentation rate (ESR), chest X-ray and ultrasonography (USG) abdomen, renal USG, ascites fluid for routine microscopy, and culture sensitivity as per indication. All these parameters were recorded on a preformed pro forma sheet.

Management was done as per the standard guidelines for the management of steroid-sensitive NS (SSNS). The initial episode of NS was treated with prednisolone at a dose of 2 mg/kg/day (maximum 60 mg) for 6 weeks followed by 1.5 mg/kg (maximum 40 mg) alternate days for another 6 weeks therapy and then discontinued. Relapse was managed with prednisolone at a dose of 2 mg/kg/day until remission achieved, subsequently, prednisolone was given at a dose of 1.5 mg/kg on alternate days for 4 weeks, and then discontinued [7]. Statistical analysis was done using SPSS software, Chi-square test, and calculation of p-value.

RESULTS

In our study, subjects presented between 2 and 14 years with a peak age of 5 and 7 years (54.2%) and a mean of 6.76±2.8 years. Male constituted 68.2% of the study groups, while females constituted 31.7% with a male to female ratio of 2.1:1. Most of the cases belonged to the lower (50%) and upper-lower (44%) class of socioeconomic status. Cases presented with the first episode were 36.4% while 63.6% of cases were having a relapse (Table 1).

The most common presenting symptom was generalized edema in 100% cases followed by oliguria in 26% cases as shown in Table 2.

The incidence of hypertension was more in higher age groups. In 2–4 years of age group, only 0.5% of cases were hypertensive, while 15.5%, 46%, and 80% of patients were hypertensive in 5–7 years, 8–10 years, and 11–14 years age group, respectively. This correlation was statistically significant, Chi-square=32.68; p<0.001. On investigation, the mean serum albumin was 2.1±0.39 g/dl (range – 1.8–2.4 g/dl), while hypercholesterolemia and hypoalbuminemia were presented in all cases (Table 3).

It was observed that the incidence of hypertension increased with high ESR. The subjects without hypertension had a mean ESR of 59±30 while subjects with hypertension had mean ESR of 104.3±25.6 (t-test – 11.33, p<0.0001). It was found that 15% of the subject had AKI while 85% had a normal renal function. A total of 19% subjects presented with microscopic hematuria. The incidence of renal impairment was increased in children with 65% hematuria (Chi-square=48.44; p<0.0001). It was found that 57.9% subjects had normal renal USG, while 42.1% subjects had abnormalities in renal USG with increased renal echogenicity.

Table 1: Demographic profile of the study subjects

Variable	Group	Cases (107)	Percentage
Age at presentation	2–4 year age group	19	17.8
	5–7 year age group	58	54.2
	8–10 year age group	15	14.0
	10–14 year age group	15	14.0
Gender	Male	73	68.2
	Female	34	31.7
Socioeconomic status	Lower	50	46.7
	Upper lower	44	41.1
	Lower middle	10	9.3
	Upper middle	03	2.8
	Upper	00	-
First episode/ relapse	First episode	39	36.4
	First relapse	33	30.8
	Second relapse	26	24.4
	More than 2 relapses	9	8.4

Table 2: Presenting symptom and sign of nephrotic syndrome in study subjects

Presenting symptom and sign	Cases	Percentage
Presenting symptoms		
Edema	107	100
Fever	27	25.2
Malaise	15	14
Oliguria	28	26
Cough	16	14.9
Abdominal pain	8	7.4
Sign on clinical examination		
Ascites	59	55.1
Hypertension	29	27
Fever	27	25.2
Pleural effusion	14	13.1
Tachypnea	6	5.6

Table 3: Investigation profile of study subjects

Investigation profile	Range	Mean±SD
Serum albumin	1.8–2.4 g/dl	2.1±0.39
Total cholesterol	223–489 mg/dl	341.5±78.8
Hemoglobin	7.6–12.8 g/dl	10.8±1.64
Total leukocyte count	4200–4800/mm^3	8270±1452
Erythrocyte sedimentation rate	20–141 mm at end of 1 h	71±35.7
Blood urea	14–146 mg/dl	36±8.16
Serum creatinine	0.4–1.82 mg/dl	0.74±0.24

SD: Standard deviation

A total of 73.8% subjects had typical presentation of NS while 26.2% had atypical presentation. It was found that most of the subjects in the age group 2–4 years and 5–7 years had typical presentation while most of the subjects of 8–10 years and 11–14 years had atypical presentation (Chi-square=65.29; p<0.0001). It was found out that 88.8% subjects had SSNS while 11.2% subjects had SRNS. In our study, infection was the most prevalent complication and urinary tract infection (UTI) was the most common infection, seen in 26 (24.3%) subjects followed by pneumonia in 9 (8.4%) and peritonitis in 4 (3.7%) cases. Other complications were AKI in 8 (7.5%) and hypovolemia in 3 (2.8%) subjects.

DISCUSSION

The age of study subjects' ranged between 2 and 14 years with a peak age of 5 and 7 years and a mean of 6.8±2.8 years. The mean age was similar to that reported in other studies. In a study by Sahana [8], mean age at presentation was 7.4 years. In their study, 65% of the subjects belonged to 6–12 years of age followed by 1–5 years (31%). Pandya and Mehta [9] reported mean age as 4.08 years and Kiran and Kumar reported the mean age at presentation as 6.7 years [10]. There were 73 (68.2%) males and 34 (31.7%) females with a male-female ratio of 2.1:1. Sahana [8] found that 76% of the subjects were males while 24% were females with male to female ratio of 3.27:1 suggesting a male preponderance. Pandya and Mehta and Kiran and Kumar also observed male predominance in their studies [9,10].

Fever presented in 25.2% of subjects which was due to infections such as upper respiratory tract infection, UTI, and pneumonia and these infections could be triggering factors for relapses in NS. Oliguria was presented in 26.1% of subjects which may be due to decreased intravascular volume of fluid due to shifting from intravascular to extravascular space or may be due to renal failure which was a feature of atypical NS. Sahana [8] observed it in 53.1% subjects whereas Kiran and Kumar [10] found oliguria in 40% subjects. Gross hematuria was presented in 5.6% of subjects. Sahana [8] found that all patients presented with puffiness of face and swelling of limbs. History of decreased frequency and volume of micturition was obtained in 53.9% while burning micturition was noted in 4.26% of subjects.

On clinical examination, we found that all the patients had edema (100%) and ascites (55.1%). Hypertension was presented in 29 (27.1%) subjects, fever in 27 (25.2%), tachypnea in 6 (5.6%), and pleural effusion in 14 (13.1%) subjects. Sahana [8] found that edema with facial puffiness was presented in 100% of subjects, ascites in 63%, pleural effusion in 15%, and hypertension 12% of the subjects before initiation of corticosteroid therapy. Incidence of hypertension was lower in their study may be due to lesser number of subjects with relapse.

Kiran and Kumar observed edema in 96% of the subjects, ascites in 90%, and pleural effusion in 30% of subjects [10]. Pandya and Mehta [9] found that hypertension was presented in 6.7% of children with SSNS. A similar study done by Patil and Bendale [11] found more hypertension than in our study (53.13%) which could be due to small sample size and more cases of higher age group. Incidence of hypertension (27.1%) and hematuria (5.6%) was higher from other similar studies which could be due to the inclusion of relapse cases in study.

The study had a few limitations such as small sample size and it did not differentiate between treatment-related and disease-related complications.

CONCLUSION

In our study, the most common age of presentation of NS was between 5 and 7 years with a mean of 6.76±2.8 years and male:female was 2.1:1. Almost all patients presented with edema and the most common complication was UTI. Our study emphasized that renal impairment and hypertension were not uncommon among hospitalized cases of NS.

REFERENCES

1. Bagga A, Mantan M. Nephrotic syndrome in children. Indian J Med Res 2005;122:13-28.
2. Eddy AA, Symons JM. Nephrotic syndrome in childhood. Lancet 2003;362:629-39.
3. Rheault MN, Zhang L, Selewski DT, Kallash M, Tran CL, Seamon M, *et al*. AKI in children hospitalized with nephrotic syndrome. Clin J Am Soc Nephrol 2015;10:2110-8.
4. Kerlin BA, Ayoob R, Smoyer WE. Epidemiology and pathophysiology of nephrotic syndrome-associated thromboembolic disease. Clin J Am Soc Nephrol 2012;7:513-20.
5. Wei CC, Yu IW, Lin HW, Tsai AC. Occurrence of infection among children with nephrotic syndrome during hospitalizations. Nephrology (Carlton) 2012;17:681-8.
6. Short versus standard prednisone therapy for initial treatment of idiopathic nephrotic syndrome in children. Arbeitsgemeinschaft fur padiatrische nephrology. Lancet 1988;1:380-3.
7. Indian Pediatric Nephrology Group, Indian Academy of Paediatrics, Bagga A, Ali U, Banerjee S, Kanitkar M, Phadke KD, Senguttuvan P, *et al*. Management of steroid sensitive nephrotic syndrome. Revised guidelines. Indian pediatr 2008;45:203-14.
8. Sahana KS. Clinical profile of nephrotic syndrome in children. JEMDS 2014;3:863-70.
9. Pandya NK, Mehta KG. Clinical profile of patients with steroid sensitive nephrotic syndrome at tertiary care centre in Gujarat, India. Int J Contemp Pediatr 2018;5:1172-5.
10. Kiran PA, Kumar BD. Clinic-biochemical evaluation of nephrotic syndrome in children. Int J Contemp Med Res 2017;4:2214-7.
11. Patil RN, Bendale AG. A study of clinical profile and associated factors of nephrotic syndrome in children at tertiary health care center. MedPulse Int J Pediatr 2017;2:5-7.

Funding: None; Conflicts of Interest: None Stated.

How to cite this article: Agrawal A, Singh RP. Clinical profile and complication of nephrotic syndrome in a tertiary health care center in central India. Indian J Child Health. 2020; 7(1):22-24.

Doi: 10.32677/IJCH.2020.v07.i01.006