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Original Research Article

Clinical and biochemical presentation of childhood nephrotic syndrome: a comparative study of first episode and first relapse

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ABSTRACT

Background: Relapse of nephrotic syndrome occurs in 60-70% of initial responders. Relapse episodes may increase the morbidity and mortality in these patients. This study was planned to compare clinical presentation and biochemical derangements between first episode and first relapse of nephrotic syndrome.
Methods: All children 1-18 years of age group, admitted with either first episode or first relapse nephrotic syndrome were included in this cross-sectional study, conducted in a teaching hospital. Besides detailed clinical examination, all the children were subjected to renal function tests, lipid profile, hemogram, CRP test and urine examinations.
Results: Total 41 children (58.53% fresh and 41.46% relapse cases) qualified to be included in the study. Decreased urine output was more prevalent in first episode group (100% vs. 70.58%, p<0.05), and cough was more common in relapse group (52.94% vs.16.67%, p<0.05). In relapse group 35.29% had raised urea (more than 40mg/dl) and 23.52% had raised creatinine (more than 1 mg/dl) in comparison to none in first episode (p<0.05). Serum cholesterol more than 400mg/dl was more prevalent in relapse group in comparison to first episode (52.94% vs. 20.83% respectively, p-0.047).
Conclusions: Cough is more prevalent in relapse group in comparison to first episode of nephrotic syndrome. Similarly, degree of rise of serum cholesterol and derangements of renal functions are more in relapse group.

Keywords: AKI, Hypoalbuminemia, Lipid profile, Proteinuria

INTRODUCTION

Nephrotic syndrome is characterized by the presence of oedema, nephrotic range proteinuria, hypoalbuminemia and hyperlipidemia.[1,2] It remains the most common manifestation of glomerular disease in childhood.[3] Worldwide annual incidence ranges from 2-7 per lakh children. Incidence in south Asian children is further higher.[4,5]

Ninety five percent cases in children are idiopathic (primary).[6] Minimal change disease remains the most common (in more than 80% cases) histological type, which responds to steroid therapy in more than 90% of cases.[7,8] Relapses occur in 60-90% of initial responders. Relapse episodes may increase the morbidity and mortality in nephrotic patients.[9] This study was planned to compare the clinical presentation and biochemical derangements between first episode and first relapse nephrotic syndrome children.

METHODS

It was a cross sectional observation study conducted over a period of one year in a tertiary care hospital attached to Government medical college. All children 1 to 18 years

of age admitted with nephrotic syndrome either as a first episode or as a first relapse during this period were included. Nephrotic syndrome was defined as presence of oedema in combination with albuminuria (at least 3+++ with dipstick or boiling test), hypoalbuminemia (serum albumin ≤2.5 gm/dl) and hyperlipidemia (serum total cholesterol more than 200mg/dl). Patients with dysmorphism or congenital malformations were excluded. Written informed consent was obtained from the parents of all participants. The study was approved by Institutional ethics committee.

Clinical and demographic characteristics including age, sex, weight, height, dwelling and religion were noted. Clinical features with which they presented were also noted. Renal function tests (serum urea, creatinine, and albumin), lipid profile (serum total cholesterol and triglyceride), hemogram (total leucocyte count and hemoglobin), CRP test, and Urine examination were done in all. Presence of more than 5 WBCs per high power field (HPF) and more than 5 RBCs per HPF were labelled as pyuria and hematuria respectively.

All the collected data were recorded in a pre-structured format and then were transferred to Microsoft excel sheet. Graph pad software was used for statistical analysis. Qualitative data were expressed as percentage and were analysed using Fisher's exact test. Quantitative data were presented as mean±SD and were compared by Student's t-test. Both side p value less than 0.05 was considered significant.

RESULTS

Total 41 children qualified to be included in the study; out of which 24/41 (58.53%) were fresh cases, and 17/41 (41.46%) had first relapse. Clinical and demographic characteristics of both the groups have been compared in Table 1.

Table 1: Comparison of demographic and clinical characteristics.

Characteristics	First episode (n-24)	First relapse (n-17)	p
Age (years)	3.82±3.04	6.11± 2.79	0.018
Weight (kg)	17.12±8.22	23.31±11.63	0.052
Height (cm)	95.87±18.93	111.35±15.86	0.008
Male/Female	18/6	11/6	0.507
Hindu/Muslim	19/5	14/3	1
Rural/Urban	16/8	12/5	1

On comparing clinical presentation decreased urine output was more prevalent in first episode group (100% vs. 70.58%, p<0.05), and cough was more common in relapse group (52.94% vs.16.67%, p<0.05) (Table 2). Six out of seventeen (35.29%) had serum urea more than 40mg/dl in relapse group in comparison to none in first episode (Fisher's exact test, p-0.002), similarly raised serum creatinine (more than 1mg/dl) was also more common in the former group (4/17, 23.52% vs. 0/24 respectively, p-0.023). Serum cholesterol more than 400mg/dl was more prevalent in relapse group in comparison to first episode (52.94% vs. 20.83% respectively, p-0.047).

Table 2: Comparison of clinical presentation.

Clinical presentation	First episode (n-24)	First relapse (n-17)	p
Abdominal distension	4 (16.67%)	1 (5.88%)	0.382
Cough	4 (16.67%)	9 (52.94%)	0.019
Pain in abdomen/chest	1 (4.17%)	4 (16.67%)	0.141
Crying/burning during micturition	1 (4.17%)	5 (29.41%)	0.065
Decreased urine output	24 (100%)	12 (70.58%)	0.008
Anasarca	9 (37.5%)	3 (17.64%)	0.296
Hypertension	0 (0%)	1 (5.88%)	0.414

Leucocytosis (total white cell count more than 11000/mm^3) was again more common in relapse group in comparison to first episode (64.70% vs. 25% respectively, p-0.023). Proportion of hematuria (first episode 0% vs. relapse 11.76%, p-0.165) and pyuria (first episode 12.5% vs. relapse 35.29%, p-0.125) was comparable in both the groups. Raised CRP was also proportionate in both the groups (first episode 0% vs. relapse 11.76%, p-0.165). Comparison of laboratory parameters has been summarized in Table 3.

DISCUSSION

Around 50-60% children with steroid sensitive nephrotic syndrome have frequent relapses or steroid dependence. Younger age at onset (less than 3 years), delayed remission (after 7-9 days), early relapse (within 6 months) and short course of steroid therapy are considered the predictors of frequent relapses.[10-14] In the present study we compared clinical presentation and biochemical derangements between 24 cases of first episode and 17 cases of first relapse of nephrotic syndrome.

In the present study cough was more prevalent in relapse group in comparison to first episode (52.94 vs. 16.67%, p<0.05). Viral upper respiratory tract infection has been identified as a trigger for relapse in at least 50% of cases.[15,16] UTI is also considered as an important cause of relapse but in the present study proportion of pyuria in both the groups was equal.[17,18]

In the present study serum cholesterol levels were much higher in relapse group in comparison to first episode (417.29±121.80 vs. 349.33±87.07 mg/dl respectively, p-0.043), but serum triglyceride levels were comparable in

both the groups (268.70±137.44 vs. 274.29±138.60 mg/dl respectively, p-0.899). Mahmud et al also observed higher cholesterol in relapse in comparison to non-relapse group (334±46 vs. 232±34 mg/dl, p<0.05) and they concluded that higher serum total cholesterol may be regarded as a predictor of relapse in childhood idiopathic nephrotic syndrome.[19] Almost similar findings (mean cholesterol 568.52 in relapse vs. 343.4 mg/dl in first episode) were observed by Dnyanesh et al.[20] In the present study, highest serum cholesterol level was 630mg/dl in first episode and 648 mg/dl in relapse group,

Table 3: Comparison of laboratory parameters.

Laboratory parameters	First episode (n-24)		First relapse (n-17)		p
	Mean±SD	Range	Mean ±SD	Range	
Haemoglobin (g/dl)	12.51±1.67	9.2-15.8	11.77±1.18	9.2-14	0.124
Serum urea (mg/dl)	25.66±7.77	14-44	36.96±24.67	15.4-117	0.047
Serum creatinine (mg/dl)	0.71±0.18	0.21-1	0.86±0.29	0.4-1.63	0.053
Serum albumin (g/dl)	2.29±0.17	1.8-2.6	2.10±0.43	1.2-2.99	0.068
Serum total cholesterol (mg/dl)	349.33±87.07	248-630	417.29±121.80	236-648	0.043
Serum triglyceride (mg/dl)	274.29±138.60	151-658	268.70±137.44	128-656	0.899
Total leucocyte counts (per micro litre)	9896.33±3461.17	5643-17590	13036.17±3990.52	7630-18880	0.0106

these findings are in concordance with the results of previous studies (serum cholesterol 676 mg/dl by Dnyanesh et al and 641 mg/dl by Banerjee et al).[20, 21] In the present study, none of our child in first episode group had renal dysfunction (raised urea or creatinine), but it (raised serum creatinine) was present in 23.52% cases in relapse group. In contrast decreased urine output was more common in first episode group. Rheualt et found incidence of AKI to be 58.6% in children admitted with nephrotic syndrome.22 Higher incidence of AKI in their study might be because of inclusion of all admissions (fresh as well as all relapse cases) and repeated measurements of serum creatinine.

Prednisolone remains the cornerstone of therapy in nephrotic syndrome. As respiratory tract infections trigger the relapse in more than half of the cases, some authors suggest initiation of daily prednisolone therapy or increase in the maintenance dose of prednisolone during these episodes.[15,16,23,24] Similarly zinc supplementation has also been shown to reduce relapse rate in SSNS.[25]

CONCLUSION

As cough is quiet prevalent in relapse group, onset of respiratory tract infections may warrant the initiation of daily dose of steroid in nephrotic patients. Lipid profile is more deranged during relapse episode, which requires regular follow up till it is normalized. Similarly, renal derangements are more during relapse, suggesting intravascular depletion.

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