Clinical Aspects and Patterns of Treatment Response to Steroid in Children with Idiopathic Nephrotic Syndrome in Mukalla Maternity and Child Hospital, Hadhramout, Yemen

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Abstract:

Background: Idiopathic nephrotic syndrome (INS) is a common and important chronic kidney disease in childhood.

Objectives: The objective of this study was to illustrate the clinical aspects and treatment response pattern of the Idiopathic nephrotic syndrome steroid.

Methods: A six-year retrospective research was conducted on children with INS who were treated at Mukalla Maternity and Child Hospital in Hadhramout, Yemen.

Results: This study included 62 children aged 1-15. All patients were complained from generalized edema 100 (100%), followed by abdominal distension 44 (71%) and ascites 40 (64.5%). Children older than 6 years, and those presenting with hypertension or hematuria, were significantly more represented in the steroid-resistant group compared to the steroid-sensitive group ($P < 0.05$). Forty nine patients (79%) were steroid sensitive nephrotic syndrome, of whom seven children (14.3%) developed complete remission and 42 children (85.7%) developed relapsed of whom 19 children (38.8%) had infrequent relapses, 11 children (22.4%) had frequent relapsing, and 12 children (24.5%) had steroid depend. Thirteen patients (21%) were steroid resistant nephrotic syndrome.

Conclusions: A relapsing course was observed in most children with INS. The patients were really needed biopsy in order to give proper protocol for treatment and to the determine prognosis.

Keywords: Clinical aspects, Steroid response, Children, Idiopathic Nephrotic syndrome, Yemen

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الجوانب السريرية وانماط الاستجابة العلاجية للستيرويد عند الاطفال المصابين بالمتلازمة الكلوية مجهولة السبب بمستشفى المكلا للأمومة والطفولة - حضرموت – اليمن

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الملخص

الخلفية: تعتبر المتلازمة الكلوية مجهولة السبب من أمراض الكلى الشائعة والمزمنة عند الأطفال.

الهدف: هدف هذه الدراسة هو توضيح الجوانب السريرية ونمط الاستجابة للعلاج بالستيرويد لمتلازمة الكلى مجهولة السبب.

الطرق: دراسة إستعادية للاطفال المصابين بالمتلازمة الكلوية مجهولة السبب بمستشفى المكلا للأمومة والطفولة بمحافظة حضرموت- اليمن خلال ست سنوات.

النتائج: تم دراسة 62 مريض مصاب بالمتلازمة الكلوية مجهولة السبب وتتراوح أعمارهم من سنة إلى خمس عشرة سنة. كل المرضى كانوا يعانون من ودمة بنسبة 100% وانتفاخ بالبطن بنسبة 71% ثم استسقاء بطني بنسبة 64.5%، ان العمر أكثر من ست سنوات وارتفاع ضغط الدم واحمرار البول أعلى في حالات العلاج المقاومة للاسترويد مقارنة بحالات الأستجابة البدائية للعلاج وذات دلالة احصائية هامة اقل من (0.05). أثناء فترة المرض كانت الأستجابة البدائية للعلاج بنسبة 79%، منها نسبة 14.3% كانت استجابتهم مستديمة و 85.7% عندها انتكاسة منها 38.8% يعانون من انتكاسة غير متكررة، و 22.4% يعانون من انتكاسة متكررة و 24.5% ضمن الحالات المعتمدة على الاسترويد، وتشكل حالات العلاج المقاومة للاسترويد نسبة 21%.

الاستنتاجات: غالبية الاطفال يعانون من انتكاسة. هناك حاجة حقيقية لأخذ خزعة من المرضى الآخرين من أجل إعطاء البروتوكول المناسب للعلاج ولتحديد التنبؤ.

الكلمات المفتاحية: الجوانب السريري، الاستجابة للستيرويد، الاطفال، متلازمة الكلى مجهولة السبب، اليمن.

Introduction:

Idiopathic nephrotic syndrome (INS), distinguished by significant proteinuria, hypoalbuminemia, and/or associated edema, is the most prevalent glomerular disorder in pediatric patients. The incidence varies from 1.15 to 16.9 per 100,000 children, differing on ethnicity and geography (1,2).

Children typically exhibit mild edema, initially observed around the eyes and in the lower extremities. Nephrotic syndrome (NS) may be initially misidentified as an allergic condition due to the periorbital swelling that diminishes over the course of the day. Over time, the edema becomes widespread, leading to the formation of ascites, pleural effusions, and genital edema (3). In the context of active disease, the depletion of proteins essential for numerous biological functions may lead to complications, including infections, thromboembolic events, and acute kidney injury (AKI) (4,5).

While over 85% of children diagnosed with nephrotic syndrome show a positive response to corticosteroids, around 10–15% either do not respond initially or may develop steroid resistance later on (1,2). The effectiveness of steroid treatment has been found to differ among various ethnic groups, probably influenced by a combination of environmental and genetic factors (6). In the absence of treatment, NS in children presents a significant risk of mortality, primarily due to infections (3).

This study aimed at demonstrating the clinical characteristics and treatment response patterns to the steroid of INS in children admitted to Mukalla Maternity and Child Hospital.

Subjects and Method:

This retrospective study involved a thorough reviw of hospital records for children aged 1 to 15 years with IND, who were admitted over a six-year period from January 2014 to December 2019 at Mukalla Maternity and Child Hospital in Al-Mukalla City, Hadhramout Governorate, Yemen. At least a thousand children visit this pediatric referral hospital every month, and this hospital covers three governorates: Hadhramout, Al-Mahra, and Shabwa. At the time of data collection in January 2020, the patient files accessible in the medical records included the information necessary to meet the objectives. This included demographic characteristics, clinical presentation, complications, illness course, and management methods.

The criteria for diagnosis of NS were proteinuria > 3.5 g/24 hr or a urine protein- creatinine ratio >2, hypoalbuminemia (≤2.5 g/dL), edema, and hyperlipidemia (cholesterol > 200 mg/dL) (3).

If no particular clinical or laboratory features were found to indicate a secondary cause, the patients were classified as INS. If a secondary cause was found, they were considered as secondary NS (3). The exclusion criteria were: congenital or syndromic forms of NS (age, <1 year), family history of NS, NS with systemic disease, and incomplete records.

The patients who fulfilled the criteria of nephrotic syndrome who were initially treated with oral prednisone as a single daily dose of 60 mg/m2/day or 2 mg/kg/ day to a maximum of 60 mg daily for 4-6 weeks followed by alternate-day prednisone (starting at 40 mg/m2 every other day or 1.5 mg/kg every other day) for a period ranging from 4-6 weeks (3).

The following (7) is the breakdown of the patients into two groups according to their steroid response:

Group 1: Steroid sensitive NS (SSNS):

The course of SSNS were grouped into 4 categories:

1. Complete remission.
2. Infrequent relapse (IRNS).
3. Frequently relapsing nephrotic syndrome (FRNS).
4. Steroid dependent nephrotic syndrome (SDNS)

Group 2: Steroid resistant NS (SRNS)

Definition of terms:

Steroid-sensitive nephrotic syndrome (SSNS): Four weeks of prednisolone/prednisone (PDN) at the recommended dosage (60 mg/m2/day or 2 mg/kg/day, with a maximum of 60 mg/day) should be sufficient to achieve complete remission (8).

Remission consists of a urine protein: creatinine ratio (UPCR) of < 0.2 or < 1+ protein on urine dipstick testing for 3 consecutive days (3).

Complete remission: UPCR ≤ 20 mg/mmol (0.2 mg/mg) or < 100 mg/m2 per day, respectively, or a negative or trace dipstick for three or more days in a row (based on the first morning void or 24-hour urine sample) (8).

Relapse: On three consecutive days, with or without the return of edema, a urine dipstick reading of 3 + (≥ 300 mg/dl) or a UPCR reading of 200 mg/mmol (≥ 2 mg/mg) taken from a spot urine sample is required in a kid who has previously attained full remission (8).

Infrequently relapsing nephrotic syndrome: <2 episodes of recurrence within the first six months after the first episode's remission or less than 3 episodes in any 12-month period that follows (8).

Frequently relapsing nephrotic syndrome (FRNS): ≥ 2 relapses within 6 months after initial episode relief or ≥ 3 relapses within 12 months (8).

Steroid-dependent nephrotic syndrome (SDNS): A patient with SSNS who has two consecutive relapses while on the recommended PDN for the first symptom or relapse within 14 days of stopping it (8).

Steroid resistance nephrotic syndrome (SRNS): no complete improvement was observed in the patient within 4 weeks of treatment with the standard dose of PDN (8).

Ethical approval:

The study was approved by Mukalla maternity and child hospital administration, Hadhramout, Yemen.

Statistical methods

An analysis of the data was conducted using SPSS software, namely version 17. Regular statistical tools were employed, including frequency, mean, and standard deviation. Quality factors were compared using chi-square and Fisher exact tests for difference estimation. For statistical significance, a p-value of less than 0.05 was used.

Results:

A total of 62 children aged 1 years to 15 years with a mean age of 5.76 ±4.2 years were studied. They were 47 males (75.8%) and 15 females (24.2%) with M:F ratio of 3.1:1. A maximum number of 42 patients (67.7%), were in the 1 – 5 years age group, followed by 15 patients (24.2%) in the 6-12 years group and five patients (8.1%) in the 13-15 years group. Table 1

Table (1): Distribution of patients with INS according to age and sex

Age groups (years)	Sex		Total No. %	Ratio (M:F)
	Male No. %	Female No. %		
1–5	33 53.23	9 14.52	42 67.7	3.67:1
6–12	11 17.74	4 6.45	15 24.2	2.75:1
13–15	3 4.83	2 3.22	5 8	1.5:1
Total	**47 75.8**	**15 24.2**	**62 100**	**3.1:1**

At presentation, the most frequently observed clinical finding was edema (100%), abdominal distension in 44 patients (71%), ascites (40 patients, 64.5%), abdominal pain in 18 patients (29%), fever in 15 patients (24.2%), and malaise (15 patients, 24.2%). Pallor was present in 13 patients (21%), burning micturition in 12 patients (19.3%), and pleural effusion in 10 patients (16.1%), while cough was present in nine patients (14.5%), oliguria in eight patients (13%), tachypnea and hypertension each in five patients (8%), and hematuria in only three patients (4.8%). Table 2

Table (2): Clinical aspects among children with INS

Clinical parameters	Patients No. (%)
Edema	100 (100%)
Abdominal distension	44 (71%)
Ascites	40 (64.5%)
Abdominal pain	18 (29%)
Fever	15 (24.2%)
Malaise	15 (24.2%)
Pallor	13 (21%)
Burning Micturition	12 (19.3%)
Pleural effusion	10 (16.1%)
Cough	9 (14.5%)
Oliguria	8 (13%)
Tachypnea	5 (8%)
Hypertension	5 (8%)
Hematuria	3 (4.8%)

It was found that the child with age >6 years, hypertension, and hematuria were significantly higher in the SRNS group compared to SSNS group ($P < 0.05$). No significant difference between the SRNS group and the SSNS group regarding other clinical variables. Table 3.

Cushingoid features was the most prevalent complication, it was seen in 34 patients (54.8%) followed by urinary tract infection in 30 patients (48.4%), upper respiratory tract infection in 19 patients (30.6%) while the least presentations were gastroenteritis in seven patients (11.3%), glucosuria and pneumonia each in five patients (8%) and alopecia in three patients (4.8%). Table 4.

It was found that prednisolone, diuretics, calcium, antibiotics were administrated to all patients, followed by vitamin D in 46 patients (74.2%), angiotensin-converting enzyme inhibitors (ACE inhibitors) in 16 patients (25.8%), intravenous albumin in 12 patients (19.3%), pulse methylprednisolone in 11 patients (17.4%), while fresh frozen plasma, levamisole and cyclosporin were each prescribed to six patients (9.7) and cyclophosphamide for two patients (3.2%). Table 5.

Four patients underwent a renal biopsy, of those who were diagnosed as steroid dependent, two patients were have minimal change nephrotic syndrome, while two patients who were diagnosed as steroid resistant proved to have focal segmental glomerulosclerosis (FSGS) on biopsy.

The patterns of steroid treatment response for children with idiopathic nephrotic syndrome in this research are shown in Table 6 together with findings from other investigations.

Table (3): Associations between clinical parameters and steroid responsiveness

Variables		SSNS No.=49	SRNS No.=13	P-value
Gender	Male Female	39(79.6%) 10(20.4%)	8(61.5%) 5(38.4%)	0.18
Age	<6 years >6 years	38(77.6%) 11(22.4%)	4(30.8%) 9(69.2%)	0.003
Generalised edema	Yes No	49(100%) 0(00)	13(100%) 0(00)	0.52
Abdominal distension	Yes No	35(71.4%) 14(28.6%)	9(69.2%) 4(30.8%)	0.87
Ascites	Yes No	34(69.4%) 15(30.6%)	6(46.2%) 7(53.8%)	0.12
Abdominal pain	Yes No	14(28.6%) 35(71.4%)	4(30.8%) 9(69.2%)	0.87
Fever	Yes No	10(20.4%) 39(79.6%)	5(38.5%) 8(61.5%)	0.18
Malaise	Yes No	10(20.4%) 39(79.6%)	5(38.5%) 8(61.5%)	0.18
Pallor	Yes No	11(22.4%) 38(77.6%)	2(15.4 %1) 11(84.6%)	0.58
Burning Micturition	Yes No	8(16.3%) 41(83.7%)	4(30.8%) 9(69.2%)	0.24
Pleural effusion	Yes No	7(14.3%) 42(85.7%)	3(23.1%) 10(76.9%)	0.44
Cough	Yes No	8(16.3%) 41(83.7%)	1(7.7%) 12(92.3%)	0.44
Oliguria	Yes No	7(14.3%) 42(85.7%)	1(7.7%) 12(92.3%)	0.53
Tachypnea	Yes No	3(6.1) 46(93.9%)	2(15.4%) 11(84.6%)	0.29
Hypertension	Yes No	1(2%) 48(98%)	4(30.8%) 9(69.2%)	0.009
Hematuria	Yes No	0(00) 49(100%)	3(23.1%) 10(76.9%)	0.02

SSNS: steroid-sensitive nephrotic syndrome, SRNS: steroid-resistant nephrotic syndrome

Table (4): Types of complications in studied children with INS

Clinical parameters	Patients No (%)
Cushingoid features	34 (54.8%)
Urinary tract infection	30 (48.4)
Upper respiratory tract infection	19 (30.6)
Gastroenteritis	7 (11.3)
Glucosuria	5 (8%)
Pneumonia	5 (8%)
Alopecia	3 (4.8%)

Table (5): Types of histopathology and treatment used in studied children with INS

Treatment	Complete remission No.=7	IRNS No.= 19	FRNS No.=11	SDNS No.=12	SRNS No.=13	Total No.=62
Underwent biopsy	00(100%)	00(100%)	00(100%)	2(16.7%)	2(15.4)	4(6.4%)
MCD	0(00)	0(00)	0(00)	2(16.7%)	0(00)	2(3.2%)
FSGS	0(00)	0(00)	0(00)	0(00)	2(15.4)	2(3.2%)
Prednisolone	7(100%)	19(100%)	11(100%)	12(100%)	13(100%)	62(100%)
Diuretics	7(100%)	19(100%)	11(100%)	12(100%)	13(100%)	62(100%)
Calcium	7(100%)	19(100%)	11(100%)	12(100%)	13(100%)	62(100%)
Antibiotic	7(100%)	19(100%)	11(100%)	12(100%)	13(100%)	62(100%)
Vitamin D	2(28.6%)	17(89.5%)	9(81.8%)	10(83.3%)	8(61.5)	46(74.2%)
ACE inhibitors	0(00)	0(00)	3(27.3%)	6(50%)	7(53.8%)	16(25.8%)
Intravenous albumin	0(00)	0(00)	2(18.2%)	3(25%)	7(53.8%)	12(19.3%)
Pulse methylprednisolone	0(00)	0(00)	2(18.2%)	1(8.3%)	8(61.5)	11(17.7%)
Fresh frozen plasma	0(00)	0(00)	1(9.1%)	2(16.7%)	3(23.1%)	6(9.7%)
Levamisole	0(00)	0(00)	2(18.2%)	4(33.3%)	0(00)	6(9.7%)
Cyclosporine	0(00)	0(00)	1(9.1%)	3(25%)	2(15.4)	6(9.7%)
Cyclophosphamide	0(00)	0(00)	0(00)	0(00)	2(15.4)	2(3.2%)

Table (6): Treatment response patterns to steroids in children with idiopathic nephrotic syndrome in our investigation, compared with findings from prior research

Study	Ozlu *et al.*, 2015	Carter *et al.*, 2020	Bin-Mohanna and Bin Alzoa 2014	Alharthi 2016	Bakhiet *et al.*, 2017	Ali *et al.*, 2018	Current study
Country	Turkey	Canada	Yemen	Saudi Arabia	South African	Sudan	Yemen
Number of cases	372	631	42	87	163	460	62
References number	7	9	10	11	12	13	-
SSNS	299 (80.4%)	589 (93.3%)	39 (92.9%)	66 (76%)	94 (57.7%)	330 (71.7%)	49 (79 %)
Complete remission	90 (30.1%)	143 (24. 3%)	11 (28.2%)	25 (37.9%)	-	34 (10.3%)	7 (14.3%)
IRNS	187 (62.5%)	253 (43%)	11 (39%)	-	10 (10.6%)	173 (52.4%)	19(38.8 %)
FRNS	22 (7.4%)	193 (32.7%)	17 (61%)	15 (22.7%)	55 (58.5%)	123 (37.3%)	11 (22.4%)
SDNS	-	-	-	26 (39.4%)	29 (30.9%)	-	12 (24.5%)
SRNS	73 (19.6)	42 (6.7%)	3 (7.1%)	21 (24%)	69 (42.3%).	130 (28.3)	13 (21 %)

SSNS: steroid-sensitive nephrotic syndrome, SDNS: steroid-dependent nephrotic syndrome, IRNS: infrequently relapsing nephrotic syndrome, SRNS: steroid-resistant nephrotic syndrome, FRNS: frequently relapsing nephrotic syndrome.

Discussion:

Nephrotic syndrome in children is caused by an unknown medical condition, affecting around 90% of cases. A patient with idiopathic nephrotic syndrome has primary glomerular damage but no known medical condition or medication that might be the root cause (3).

The present study aimed to determine the clinical aspects and pattern of treatment response to the steroid of INS at Mukalla maternity and child hospital in Hadhramout Governorate, Yemen. INS was discovered to be more prevalent in male children (47, 75.8%) than female children (15, 24.2%), resulting in a male-to-female ratio of 3.1:1. A comparable discovery was reported by Bin-Mohanna and Bin Alzoa in Yemen (3.2:1) (10) and by Indupriya *et al.* in India (3:2)(14). Other studies in India by Agrawal and Singh, reported that a male to female ratio of 2.1:1(15), and in Sudan, it was 2:1(13). A study in Egypt by Abdel-Rahim *et al.*, reported a lower male to female ratio of patients (1.6:1) at the onset of INS (16). There is no clear mechanism to explain male predominance.

The predominant age group at presenting was 1-5 years, a finding that aligns with earlier studies conducted in various regions (10,17,18). In our study, the mean age of the patients at the onset of INS was 5.76±4.2 years. This is nearly similar to a study done by Sudan that revealed the mean age at onset of INS was 5.2 ± 3.5 years (13), and in Botswana, it was 5.96 ± 3.06 years (19),while in Yemen was 6.54±2.25years (10). Other studies in Egypt reported the mean age of the patients at the onset of INS to be 4.87±2.94 years(16), while a study in India by Kumar *et al.*, reported a higher mean age of patients (7.9 ± 5.1 years) at the onset of INS (20).

It was also found that the child with age >6 years was significantly higher in the SRNS group compared to SSNS group ($P < 0.05$). These data are consistent with other studies. (21,22). Patients under the age of 6 years are more likely to exhibit a favorable response to treatment, as this age group is characterized by the prevalence of minimal change nephrotic syndrome, which is the most common histologic type of idiopathic nephrotic syndrome, occurring in 85-90% of patients in this age range (1). All the patients had edema (100%) and ascites (64.5%). Similar to the observation made by Sahana, and Behera *et al.* (23,24).

In this investigations, hypertension was noted in (8%) of cases. Which similar to that observed by Lingayat *et al.*, (7.14%) (25) and less than data from Albar and Bilondatu (26.8% %) (17) and from Patil and Bendale (53.13%) (26).

Hypertension was present in 10% of patients with minimal changes in nephrotic syndrome (3). This study also showed that the child with hypertension was significantly higher in the SRNS group compared other studies (16,27,28). Hypertension is one of the atypical features of NS that is more likely to be SRNS (28).

Hematuria was observed in (4.8%) patients in this study; Which is similar to that observed by Agrawal and Singh (5.6%) (15) but lower than that observed by Ali *et al.* in Sudan (19.1%). (13), and by Sahana (12.5%) (23). It was also found that the patients with SRNS had a higher frequency of hematuria ($P = 0.001$) compared with the SSNS group. This is consistent with other studies (16,27). While hematuria has been documented as one of the features that make MCNS less likely, and hence, a higher likelihood of steroid resistance; still, up to 10-20% of children with minimal change nephrotic syndrome (MCNS) still experience hematuria (3).

In our study, the most common complication was cushingoid features (54.8%). This result was in agreement with Ali *et al.*, who found that the commonest complication in his study was cushingoid features (37.5%) (13). However, Lingayat *et al.*, found that urinary tract infection was the most common complication seen in (18.57%), followed by peritonitis in (11.42%) (25). It is widely recognized that complications may be noticed as a result of the disease or the medications used to treat NS (29).

During the course of the illness, the patients who were initially steroid responders were 49 patients (79%), of whom 7 patients (14.3%) achieved long-term remission and 42 patients (85.7%) developed relapsed of whom 19 patients (38.8%) had infrequent relapses, 11 patients (22.4%) had frequent relapsing, and 12 patients (24.5)% had steroid depend.

As shown in table (6) that about 57.7-93.3% of INS in children were initially steroid sensitive NS, and children that remained in complete remission range from (10.3%- 37.9). Among these studies (10.6% - 62.5%) developed infrequent relapse, while frequently relapse range from (7.4 - 61%) and steroid depend between (30.9- 39.4%). Compared to previous studies on the pattern of steroid response in INS (7,9,10,11,12,13), our series shows some similarities and differences. The reason for the significant difference in the number of studies showing a pattern of steroid response might be because of factors such as ethnicity and geographic location, which greatly influence the likelihood of steroid response in INS (30), as well as the underlying renal histology.

Steroid resistance was encountered in 13 patients (21%) in this study. These data are consistent with other studies (11,13). However lower percentage was found in India by Agrawal and Singh (11.2%) (15), while in a study in South Africa by Bakhiet *et al.*, the higher percentage was reported in 42.3% (12). Kaddah *et al.*, in Cairo, Egypt, noticed that 34% of their investigated patients had SRNS, which was elucidated by increased consanguinity as per the authors' explanation (31).

All the patients were used prednisolone, diuretics, calcium, antibiotics. ACE inhibitors were used in 25.8% of cases. It is was also found that 19.3% of the children received albumin infusion, and 9.7 % used FFP.

Supportive therapy is beneficial as an adjuvant to specific treatment in the management of nephrotic syndrome. Therapeutic agents that may be required for the management of nephrotic syndrome are diuretics, ACE inhibitors, and antibiotic therapy. Supplementation with vitamin D and calcium may be beneficial for patients receiving corticosteroid therapy (32).

Four patients underwent a renal biopsy, of those who were diagnosed as steroid dependent, two patients were have minimal change nephrotic syndrome, while two patients who were diagnosed as steroid resistant proved to have focal segmental glomerulosclerosis (FSGS) on biopsy. This is consistent with other studies (10,33). Bakhiet *et al.*, have found that minimal change disease was the most common histopathological type seen in SSNS (60%), while FSGS was the most common observed in patients who had SRNS (65.2%) (12). Other studies in Sudan reported that renal histology in SSNS showed mesangioproliferative glomerulonephritis (MesPGN) in 57.5%, minimal change disease (MCD) in 35.5%, and focal segmental glomerulosclerosis (FSGS) and IgM nephropathy in 3.5% each (13).

Steroid dependent and resistant patients were biopsied in Egypt, Jordan and Saudi Arabia due to no facilities in our country and were treated with steroids in addition to one of the immunosuppressive medications, including cyclophosphamide and cyclosporine. Other cases needed biopsy and not done may due to refused relatives due to fear from the complication of biopsy, and many patients had no facility to go out of Yemen due to war conditions.
Patients who are steroid-dependent, frequent relapses, or exhibit steroid resistance are appropriate candidates for alternative therapies. This is especially true for individuals who exhibit significant symptoms of corticosteroid toxicity, such as a cushingoid look, high blood pressure, cataracts, or growth failure (3). A number of limitation should be noted about our study, including its retrospective design, the small sample size of patients who underwent kidney biopsy, and the fact that additional individuals required biopsy.

Conclusions:

A relapsing course was observed in the majority of children with idiopathic nephrotic syndrome. Children older than 6 years, and those presenting with hypertension or hematuria, were significantly more represented in the steroid-resistant group compared to the steroid-sensitive group ($P < 0.05$). Although renal biopsy was performed in only four patients, other number of cases needed renal biopsy to inform proper treatment strategies and to determine the prognosis.

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