Behavior Pattern of Children with Nephrotic Syndrome Treated with Glucocorticoid

Shaheed Hossain Sourav[a*], Anwar Hossain Khan[b], Shanjoy Kumar Paul[c]

ARTICLE INFO

Received: 18 Jan 2026
Revised: 29 Jan 2026
Accepted: 1 Feb 2026
Published Online: 16 Feb 2026

DOI: 10.5281/zenodo.18654525

Volume: 8, Number: 2, Page: 2-6

e-ISSN: 2789-5912
ISSN: 2617-0817

*Corresponding author

ABSTRACT

Background: Chronic diseases, such as nephrotic syndrome (NS), are linked to psychological stress. Glucocorticoid treatment in children with NS can also result in various negative effects, including issues with behavior. In clinical practice, the psychosocial elements of care can be neglected under the urgency to address the disease process, unless their significance is highlighted by valid evidence. **Objectives:** To recognize the psychological characteristics in children with NS through a specific instrument named "The Strengths and Difficulties Questionnaire" (SDQ) and to examine those behavioral issues. **Methods & Materials:** This prospective case-control study was carried out in different institutes and medical college hospitals of Dhaka and Bogura, namely National Institute of Kidney Diseases & Urology, Dhaka Medical College Hospital, Sir Salimullah Medical College & Mitford Hospital, Shaheed Suhrawardy Medical College Hospital, Institute of Child & Mother Health, Dhaka and Shaheed Ziaur Rahman Medical College Hospital, Bogura from June 2017 to May 2018. A total of 100 NS cases aged 4-17 years were included through purposive sampling, along with 100 healthy controls matched for age and sex. The SDQ scoring was utilized to assess the behavior patterns. A data gathering sheet was created, utilizing the Bengali version of the SDQ template. Various metrics of variables were chosen. The SDQ was assessed alongside those variables, and the data were examined using SPSS (version 22). **Results:** The emotional symptoms scale, conduct problems scale, peer relationship problems scale, and total scale were notably higher in cases compared to controls, while the pro-social behavior scale was significantly lower. **Conclusion:** Children with NS show notable emotional symptoms, behavioral problems, and difficulties in peer relationships.

Keywords: *Behavior pattern, nephrotic syndrome, SDQ*

[a.] *Assistant Professor (Insitu), Department of Pediatric Nephrology, Dinajpur Medical College, Dinajpur, Bangladesh (ORCID: 0009-0008-4298-0429)*
[b.] *Former Professor & Head, Department of Pediatric Nephrology, National Institute of Kidney Diseases and Urology, Dhaka, Bangladesh (ORCID: 0009-0007-6014-665X)*
[c.] *Former Professor & Head, Department of Pediatric Nephrology, Sir Salimullah Medical College, Dhaka, Bangladesh (ORCID: 0009-0005-2091-3346)*

Introduction

Nephrotic syndrome (NS) mainly affects children, with its occurrence in pediatric populations surpassing that in adults. A large number of children with NS experience fairly mild steroid-sensitive minimal change disease. Teeninga et al. (2012) noted that this condition progresses to repeated relapses, often associated with steroid dependence in 20 to 60% of individuals [1]. Bagga et al. (2005) discovered that minimal change NS is more prevalent in boys than in girls (2:1) and typically arises between the ages of 2 and 6 years [2]. Interactions with peers during childhood are closely related to emotional, behavioral, and adjustment problems. A positive relationship with peers is essential for a tranquil and healthy existence. To keep pace with peers, a positive mental state and family engagement are crucial, as highlighted by Kim et al. (2001) and Newcomb et al. (1993). Coie et al. (1992) found that parental reports of externalized disorders and self-reports of internalized disorders can predict childhood peer social status [3-5]. The authors also emphasized the need for information sources to align the connections between predictor and outcome variables. Any long-term physical condition, especially in children, presents biological, behavioral, and social signs that affect their mental well-being, social and personality growth, and family adaptation (Stein and Jessop, 1989) [6]. Ozkaya et al. (2004) discovered that this would also naturally pertain to children with NS due to its prolonged relapsing and remitting trajectory [7].

Kids with long-term physical health issues are more likely to experience behavioral problems. Diseases impact not only psychosocial growth but also heighten behavioral issues in siblings, adding extra strain on family life. Mushtaq et al. (2010) noted that conditions like insulin-dependent diabetes mellitus, cancer, cystic fibrosis, juvenile rheumatoid arthritis, and asthma are linked to higher rates of psychopathologies, including behavioral issues in children [8]. Lau et al. (1982) indicated that in high-demand clinical settings, the psychosocial dimension of care might be neglected amid the urgency to manage and regulate diseases, unless their significance is highlighted by relevant evidence [9]. This scenario could also be applicable in our nation. NS is a type of illness that needs to be managed correctly to decrease morbidity and mortality. If issues related to behavior persist, it will impose a significant strain on both the patient and their family. Thus, these patients need to be considered thoughtfully at the onset of the disease to avert behavioral issues.

Methods & Materials

This was a prospective case-control study conducted in different institutes and medical colleges of Dhaka and Bogura including department of pediatric nephrology, National Institute of Kidney Diseases & Urology; in-patient department of Dhaka Medical College Hospital, Sir Salimullah Medical College & Mitford Hospital, Shaheed Suhrawardy Medical College Hospital, Institute of Child & Mother Health, Dhaka and Shaheed Ziaur Rahman Medical College Hospital, Bogura, Bangladesh, between June 2017 and May 2018. A total of 100 cases of NS in the age range of 4-17 years were included through purposive sampling,

along with 100 healthy controls matched by age and sex. The behavior pattern was assessed through scoring with "The Strengths and Difficulties Questionnaire" (SDQ). A data collection form was created and the Bengali version of the SDQ format was utilized. Various metrics of the variable were chosen. The SDQ was assessed alongside these variables, and the data were evaluated using SPSS (version 22). A p-value was deemed statistically significant if it was ≤ 0.05.

SDQ: a widely used screening tool to assess child and adolescent mental health, with higher scores generally indicating more difficulties. All five scales, comprising the emotional symptoms scale, conduct problems scale, hyperactivity scale, peer relationship problems scale, and pro-social behavior scale, were utilized (scored as: not true=0, somewhat true=1, and certainly true=2).

Emotional symptoms scale: often complains of headache, stomach-ache; many worries, often seems worried; often unhappy, downhearted or tearful; nervous or clingy in new situations; many tears, easily scared. Conduct problems scale: often has temper tantrums or hot tempers; generally, well behaved; often fights with other children or bullies them; often lies or cheats; steals from home, school or elsewhere. Hyperactivity scale: Restless, overactive, constantly fidgeting, easily distracted, thinks things out before acting; good attention span. Peer relationship problem scale: rather solitary, tends to play alone; has at least one good friend; generally liked by other children; picked on or bullied by other children; gets on better with adults than with other children. Pro-social behavior scale: considerate of other people's feelings; shares readily with other children; helpful if someone in hurt, upset of feeling ill; kind to younger children; often volunteers to help others. The total difficulties score: by summing the scores from all the scales except the pro-social scale. The resultant score can range from 0-40.

IFRNS: infrequent relapse nephrotic syndrome

FRNS: frequent relapse nephrotic syndrome

SDNS: steroid-dependent nephrotic syndrome

Results

A total of 200 children were studied, including 100 cases and 100 controls. The mean age of cases was 7.86 ± 2.98 years, with 54% males and 88% from rural areas. Clinically, 62% of cases had mild edema, and the mean blood pressure was 87.22 ± 10.24 / 63.41 ± 6.11 mmHg. Cases had significantly higher SDQ scores for emotional symptoms (1.20 ± 1.33 vs. 0.47 ± 0.87, $p < 0.001$), conduct problems (0.45 ± 0.88 vs. 0.12 ± 0.56, $p < 0.001$), and peer relationship problems (1.40 ± 1.22 vs. 1.03 ± 0.88, $p < 0.001$) compared to controls, while pro-social behavior was slightly lower (9.52 ± 1.02 vs. 9.85 ± 0.48). Hyperactivity scores showed no significant difference.

Table I shows the demographic profile of the study subjects. In both the case and control groups, the majority of children were aged 4–10 years (cases: 80%, control: 86%), with mean ages of 7.86 ± 2.98 years and 7.19 ± 2.77 years, respectively. There was no statistically significant difference in age between the two groups, indicating comparable age distribution. Males were slightly more predominant in both groups (cases: 54%, control: 57%), and the difference in gender distribution was not significant. Most participants in both groups were from rural areas (cases: 88%, control: 92%), with no significant difference in residence.

Table I
Demographic profile of study subjects (*n*=200).

Parameters	Group		p value
	Case (n=100)	Control (n=100)	
Age (years)			
4-10	80 (80.0)	86 (86.0)	0.094*
11-17	20 (20.0)	14 (14.0)	
Mean ± SD	7.86 ± 2.98	7.19 ± 2.77	
Gender			
Male	54 (54.0)	57 (57.0)	0.669**
Female	46 (46.0)	43 (43.0)	
Residence			
Rural	88 (88.0)	92 (92.0)	0.346**
Urban	12 (12.0)	8 (8.0)	

Table II shows the clinical profile of the cases (n=100) on physical examination. Pallor was observed in 4% of the cases. Concerning edema, most experienced mild edema (62%), followed by moderate (22%) and severe edema (1%). Dehydration was present in 18% of cases. The mean systolic blood pressure (SBP) was 87.22 ± 10.24 mmHg, and the mean diastolic blood pressure (DBP) was 63.41 ± 6.11 mmHg, indicating that most children had normal blood pressure. Abnormal urine color occurred in just 2% of instances, with 1% exhibiting cloudy urine and 1% having reddish urine. The bedside heat coagulation test on urine indicated that the majority of cases exhibited ++ proteinuria (71%), with 5% showing trace and + protein each, while +++ was found in 5% and ++++ in 2% of cases.

Table II
Clinical profile of cases (n=100).

Physical examination	Frequency (n)	Percent (%)
Pallor	4	4.0
Edema:	62	62.0
Mild	22	22.0
Moderate	4	4.0
Severe	1	1.0
Dehydration	18	18

SBP (mm of Hg)	87.22 ± 10.24	
DBP (mm of Hg)	63.41 ± 6.11	
Color of urine:		
Cloudy	1	1.0
Reddish	1	1.0
Bed side heat coagulation of urine:		
Trace	5	5.0
+	5	5.0
++	71	71.0
+++	5	5.0
++++	2	2.0

Table III shows the comparison of Strengths and Difficulties Questionnaire (SDQ) scores between cases and controls. The mean scores for emotional symptoms (1.20 ± 1.33 vs. 0.47 ± 0.87, p < 0.001), conduct problems (0.45 ± 0.88 vs. 0.12 ± 0.56, p < 0.001), and peer relationship problems (1.40 ± 1.22 vs. 1.03 ± 0.88, p < 0.001) were significantly higher in cases than controls, indicating greater emotional and behavioral difficulties among the cases. In contrast, the pro-social behavior score was lower in cases compared to controls (9.52 ± 1.02 vs. 9.85 ± 0.48), suggesting reduced positive social behaviors in cases. The hyperactivity scale showed no significant difference between the two groups (1.23 ± 1.49 vs. 1.10 ± 1.33, p = 0.601). Overall, the total SDQ score was significantly higher in cases (4.28 ± 2.59) than in controls (2.72 ± 1.95), reflecting an overall higher level of emotional and behavioral difficulties in the case group.

Table III
SDQ level of different psychiatric scales in cases and control (*n*=200).

SDQ scales	Group		P value
	Case (n=100) [mean ± SD]	Control (n=100) [mean ± SD]	
Emotional symptoms scale	1.20 ± 1.33	0.47 ± 0.87	<0.001
Conduct problem scale	o.45 ± 0.88	0.12 ± 0.56	<0.001
Hyperactivity scale	1.23 ± 1.49	1.10 ± 1.33	0.601
Peer relationship problem scale	1.40 ± 1.22	1.03 ± 0.88	0.023
Pro-social behavior scale	9.52 ± 1.02	9.85 ± 0.48	0.014
Total scale	4.28 ± 2.59	2.72 ± 1.95	<0.001

Table IV shows the comparison of SDQ scores between male and female cases. There was no significant difference between males and females in emotional symptoms (1.26 ± 1.35 vs. 1.13 ± 1.31, p = 0.622), conduct problems (0.54 ± 0.97 vs. 0.35 ± 0.77), peer relationship problems (1.31 ± 1.18 vs. 1.50 ± 1.28), and pro-social behavior (9.59 ± 0.88 vs. 9.43 ± 1.19). However, the hyperactivity scale score was significantly higher in males compared to females (1.59 ± 1.58 vs. 0.80 ± 1.26, p = 0.007), indicating greater hyperactive behavior among male cases. Although the total SDQ score was higher in males (4.70 ± 2.61) than in females (3.78 ± 2.52), this difference was not reported as statistically significant.

Table IV
SDQ level of different psychiatric scales in male and female cases (*n*=100).

SDQ scales	Group		P value
	Male (n=54) [mean ± SD]	Female (n=46) [mean ± SD]	
Emotional symptoms scale	1.26 ± 1.35	1.13 ± 1.31	0.622
Conduct problem scale	o.54 ± 0.97	0.35 ± 0.77	0.313
Hyperactivity scale	1.59 ± 1.58	0.80 ± 1.26	0.007
Peer relationship problem scale	1.31 ± 1.18	1.50 ± 1.28	0.409
Pro-social behavior scale	9.59 ± 0.88	9.43 ± 1.19	0.856
Total scale	4.70 ± 2.61	3.78 ± 2.52	0.066

Table V shows the mean SDQ scores among different clinical types of nephrotic syndrome in cases. The highest proportion of cases had IFRNS (54%), followed by first attack (22%), FRNS (17%), and SDNS (7%). The mean SDQ scores were 4.35 ± 3.33 for first attack, 3.88 ± 2.25 for FRNS, 4.85 ± 3.93 for IFRNS, and 5.00 ± 2.24 for SDNS. There was no statistically significant difference in total SDQ scores among the different clinical types of nephrotic syndrome (p = 0.853), indicating that the overall level of emotional and behavioral difficulties was similar across clinical subtypes.

Table V
SDQ score of different clinical types of nephrotic syndrome in cases (*n*=100)

Clinical types of nephrotic syndrome	n (%)	Mean ± SD	P value
First Attack	22 (22.0)	4.35 ± 3.33	0.853
FRNS	17(17.0)	3.88 ± 2.25	
IFRNS	54 (54.0)	4.85 ± 3.93	
SDNS	7 (7.0)	5.00 ± 2.24	

Discussion

This study attempted to evaluate the behavioral pattern of children with NS by using SDQ as a tool and observed some significant psychological problems among them.

In the present study, mean age of cases and control was almost close to each other. This finding is similar to the studies. [10, 11]. Little older children were enrolled in a study [12], where mean age was 9.48±3.06 years in cases and 9.28±2.85 years in control.

In this study, males were predominant both in cases and control. Similar finding was also found [12, 10]. But another study enrolled similar number of male and female in their study [13].

88% of cases were from rural area in the present study. A study reported 72% cases from rural population which is comparable to our study [10].

One study revealed that the behavioral problems were significantly high among anemic children [14]. But in our study, only four percent cases were found to be pale which is very insufficient to correlate with behavior problems.

This study revealed that emotional symptoms, conduct problems and peer relationship problems were significantly higher in children with NS than their healthy control, whereas pro-social behavior was significantly lower among cases. Overall psychological problems were significantly higher in children with NS than control. Children with NS had greater emotional symptoms, more problems with their peers and more global psychological difficulties in a study [12]. Study found no statistical difference [11]. The study assessed the quality of life in children with NS [13]. They used PedsQL 4.0 generic core scale and observed significantly higher physical score and emotional score in these children. They also found significantly lower social score in cases comparing with healthy children. Other studies revealed significant higher behavioral problems among children with NS comparing with healthy children [15]. A study found that overall psychosocial scores measured by Child Behavior Checklist (CBCL) were significantly high among children with NS [16]. Study also used CBCL to assess behavioral problems and social competences in children with NS [17]. They observed significant higher score of CBCL in behavior problems and significantly lower score in social competence among children with NS comparing to their healthy counterpart. A study found in their study that commonest behavioral abnormalities were hyperkinesia followed by conduct disorder, learning disorder and obsessive-compulsive neurosis [10]. In the present study, male and female cases were compared in different SDQ scales. Significant difference in hyperactivity scale was found and total scale was also remarkable. A study reported that females were less affected psychologically than males [11]. One study concluded that boys tended to show more hyperactivity and aggressive behavior than girls [18]. But Other study did not find any statistically significant difference in SDQ scores for all scales between male and female [12]. This difference might be due to small sample size in their study (n=23).

We analyzed relationship between various clinical types of NS and SDQ scoring system, but no significant difference was found; though higher SDQ level was observed in cases of IFRNS comparing with other clinical varieties. A study also found no significant difference in emotional symptoms, conduct problems, hyperactivity, peer relationship problems and pro-social behavior among different clinical types of NS [11]. So, types of NS do not have any significant impact on psychological aspect of patients.

In this study, high cumulative dose of steroid had no role to influence the SDQ levels. But a study found positive correlation with the cumulative dose of steroid [18]. This might be due to difference in sample size (n=45) and questionnaire (CBCL) in their study. Steroid is not the principal contributing factor to change behavior. Family climate, maternal stress, illness-related variables may also play role. High dose short-term steroid can cause negative impact on behavior [19, 20].

Limitations

As it is a cross-sectional study, further assessment and evaluation of these patients could not be done. So, time taken for resolution of symptoms after discontinuation of therapy and after final cure of NS were unknown.

Conclusion & Recommendation

Children with NS experience significant emotional symptoms, conduct problems, peer relationship problems and low pro-social behavior. These should not be overlooked during management of these patients and also after completion of treatment. A longitudinal study with larger sample size should be done for deeper exploration of the problem.

References

1. Teeninga N., Kist-van Holthe JE., Nauta J., 2012. Extending prednisolone treatment does not reduce relapse in childhood nephrotic syndrome. Journal of American Society of Nephrology, 24, pp.149-159.
2. Bagga A., Mantan M., 2005. Nephrotic syndrome in children. Indian Journal of Medical Research, 122, pp.13-28.
3. Kim YK., Lee OK., 2001. The effects of peer relations on psychosocial adjustments and behavior characteristics in children and young adolescents. Korean Journal of Psychological Development, 14, pp.65-82.
4. Newcomb AF., Bukowski WM., Pattee L., 1993. Children's peer relations: a meta-analytic review of popular, rejected, neglected, controversial, and average sociometric status. Psychological Bulletin, 113, pp.99-128.
5. Coie JD., Lochman JE., Terry R., Hyman C., 1992. Predicting early adolescent disorder from childhood aggression and peer rejection. Journal of Consulting Clinical Psychology, 60, pp.783-792.
6. Stein RE., Jessop DJ., 1989. What diagnosis does not tell us: The case for a non-categorical approach to chronic illness in childhood. Social science and Medicine, 29, pp.769-788.
7. Ozkaya N., Cakar N., Ekim M., Kara N., Akkok N., Yalcinkaya F., 2004. Primary nephrotic syndrome during childhood in Turkey. Journal of Pediatric International, 46, pp.436-438.
8. Mushtaq I., Iqbal MZ., Kamara J., 2010. Nephrotic Syndrome and behavior problems in children, Indian Journal of Psychiatry, 52, pp.76-77.
9. Lau R., Williams S., Williams L., Ware J., Brook R., 1982. Psychosocial problems in chronically ill children: Physician concern, parent satisfaction, and the validity of medical record. Journal of Community Health, 7, pp.250-261.
10. Guho P., De A., Ghosal M., 2009. Behavior profile of children with nephrotic syn me. Indian Journal of Psychiatry, 51, pp.122-126.
11. Ghobrial, EE., Fahmey SS., Ahmed ME., Botrous OE., 2013. Behavioral changes in Egyptian children with nephrotic syndrome. Iranian Journal of Kidney Diseases, 7, pp.108-116.
12. Rodriguez HP., Garcia NV., Garcia RR., Mahtani CV., Betancor MM., Ramirez SG., 2007. Psychopathology associated with idiopathic nephrotic syndrome in the pediatric age group. In Anales de Pediatria, 67, pp.231-235.
13. Agrawal S., Krishnamurthy S., Naik BN., 2017. Assessment of quality of life in children with nephrotic syndrome at a teaching hospital in South India. Saudi Journal of Kidney Diseases and Transplantation, 28, pp.593-598.
14. Mubarak A., Fadel W., Said S., Hammer MA., 2009. Profile of behavior and IQ in anaemic children. CNS Spectrum, 15. pp.579-586.
15. Boraey NF., El-Sonbaty MM., 2011. Behavioral problems in children with nephrotic syndrome. Journal of Applied Sciences Research, 7, pp.2001-2007.
16. Manti P., Giannakopoulos G., Giouroukou E., Georgaki-Angelaki H., Stefanidis CJ., Mitsioni A., Stergiou N., Mihas C., Chrousos GP., Magiakou MA., Kolaitis G., 2013. Psychosocial and cognitive function in children with nephrotic syndrome: association with disease and treatment variables. BioPsycho Social Medicine, 7, pp.1-7.
17. Mehta M., Bagga, A., Pande P., Bajaj C., Srivastava RN., 1995. Behavior problems

in nephrotic syndrome. Indian Journal of Pediatrics, 32, pp.1281-1286.
18. Mishra OP., Upadhyay A., Prasad R., Upadhyay SK., Sehaefer F., 2015. Behavioural abnormalities in children with new-onset nephrotic syndrome receiving corticosteroid therapy: Results of a prospective longitudinal study. Pediatrtric Nephrology, 31, pp. 233-238.
19. Hall AS., Thorley G., Houtman PN., 2003. The effects of corticosteroids on behavior in children with nephrotic syndrome. Pediatric Nephrology, 18, pp.1220-1223.
20. Soliday E., Grey S., Lande MB., 1999, Behavioral effects of corticosteroids in steroid-sensitive nephrotic syndrome. Pediatrics, 104, pp.1-4.