

Quality of life assessment in pediatric nephrotic syndrome in North Sumatera Province: Parent-and-child proxy report

Ika Citra Dewi Tanjung¹, Dina Keumala Sari², Oke Rina Ramayani¹, Mustafa Mahmud Amin³, Bernie Endyarni Medise⁴, Muhammad Rusda⁵, Masitha Dewi Sari⁶, Nuraiza Meutia⁷

1 Department of Pediatrics, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

2 Department of Nutrition, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

3 Department of Psychiatry, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

4 Department of Child Health, Faculty of Medicine, Universitas Indonesia, Jakarta, Indonesia

5 Department of Obstetrics & Gynecology, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

6 Department of Ophthalmology, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

7 Department of Physiology, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

Corresponding author: Ika Citra Dewi Tanjung (ika.citra@usu.ac.id)

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Abstract

Background: Nephrotic syndrome (NS) is a pediatric kidney disease with a high recurrence rate, impacting patient quality of life (QoL). This study aimed to assess the QoL of NS children in North Sumatera using a parent-and-child proxy report.

Methods: This was a cross-sectional study (February–December 2023) in the nephrology and growth and developmental outpatient ward, Pediatrics Department, Adam Malik Hospital, and Prof. Dr. Chairuddin P. Lubis Universitas Sumatera Utara Hospital, Medan, Indonesia. The inclusion criteria for cases were children aged 5–18 who met the diagnostic criteria of NS. Cases were age-matched with healthy children as controls. The PedsQL 4.0 generic core scale instrument was used for the QoL assessment. Normally distributed continuous data were expressed as the mean and standard deviation; categorical data were expressed as proportions. Differences between the groups were analyzed using an independent t-test, and the correlation of illness duration and daily steroid dose with QoL was determined using the Pearson correlation test.

Results: A total of 44 NS pediatric patients were age-matched with 44 healthy children. A significant difference in QoL existed between the school scores of the NS and healthy groups in the parent proxy report ($p = 0.001$) and between the school score and total score of the child proxy report ($p = 0.003$ and $p = 0.040$, respectively). A significant difference in QoL existed in emotional scores between the remission and relapse groups in the parent-and-child proxy reports ($p = 0.019$ and 0.030 , respectively). A significant negative correlation existed between the daily steroid dose and QoL in school and the total score of the parent proxy report ($p = 0.025$; $r = -0.338$).

Conclusion: The parent and child reports revealed a significant difference in QoL between the school scores of NS pediatric patients and healthy children. A significant difference in the emotional scores of NS pediatric patients in remission and relapse was also observed. The daily steroid dose was negatively correlated with the school score in the parent proxy report.

Keywords

child proxy report, nephrotic syndrome, parent proxy report, quality of life, North Sumatera

Introduction

Chronic kidney disease is a health problem affecting societies worldwide (Falhi et al. 2021). Nephrotic syndrome (NS) is a common chronic kidney disease in children and is characterized by proteinuria, hypoalbuminemia, and edema with or without hypercholesterolemia (Trihono et al. 2016). Worldwide, the prevalence of NS is 16 cases per 100,000 children, with an incidence of two to seven cases per 100,000 children (Hilmanto et al. 2022). Non-renal complications of NS are related to cardiovascular disease, anemia, infectious diseases (Al-Radeef 2020), growth disorders, endocrine disorders, psychosocial functioning, and quality of life (QoL) disturbance (Lee et al. 2020).

NS in children has a long-term impact on QoL due to the disease and the treatment received (Ruslie et al. 2021). Understanding QoL is critical to symptom improvement and patient care. Problems discovered from QoL reports can be used to modify and improve treatment and care or indicate deficiencies in the treatment provided (Haraldstad et al. 2019). QoL assessments should be based on parent and child reports, including physical, emotional, social, and school functioning (Varni 2020).

Several studies have reported on the QoL of pediatric NS patients. A study conducted at Haji Adam Malik Hospital, Medan, revealed an increase in the physical domain of QoL in NS children at the end of treatment compared to that at the initial treatment (Ruslie et al. 2021). Most QoL assessments of NS pediatric patients are based on parental reports; only a few studies include child reports. This study aimed to assess the QoL of NS pediatric patients according to parent and child reports across all domains.

Material and methods

This study enrolled 88 pairs of children aged 5–18 and their parents from February 2023 to February 2024, comprising NS pediatric patients who attended the nephrology and growth and developmental outpatient ward, the pediatric department at Adam Malik Hospital, and Prof. Dr. Chairuddin P. Lubis of Universitas Sumatera Utara Hospital, Medan, and healthy children as controls. This study was part of doctoral dissertation research. Ethical approval was obtained from the Health Research Ethics Committee of the Universitas Sumatera Utara, Medan, Indonesia, prior to the initiation of the study with number 85/KEPK/USU/2023 on January 27th, 2023. Verbal and written informed consent was obtained from each participant. The case group comprised 44 children diagnosed with NS, both old and new patients, who were in remission

or relapse phases and had been taking steroids for at least 2 weeks. The control group comprised 44 healthy children not currently experiencing any infectious diseases.

QoL was assessed with the PedsQL 4.0 Generic Core Scales instrument in the Indonesian language, comprising 23 questions, including physical (eight items), emotional (five items), social (five items), and school (five items) functioning. This instrument consists of parent and child reports from children aged 5–7 years, 8–12 years, and 13–18 years (Desai et al. 2014). Completion involved using a 5-point Likert scale: zero (never a problem), one (almost never a problem), two (sometimes), three (often a problem), and four (almost always a problem). Scoring starts from zero to 100 in reverse: 0 = 100, 1 = 75, 2 = 50, 3 = 25, 4 = 0. The score was calculated by finding the average of each function and the total score. The higher the score obtained, the better the QoL will be (Varni 2001). The PedsQL 4.0 Generic Core Scales instrument based on parent and child reports had good reliability (Varni et al. 2005). QoL assessments can be divided into disturbances or not, with a cutoff of 70 points. A score less than 70 indicates disturbance, whereas a score above or equal to 70 indicates good QoL (Huang et al. 2009).

Statistical analysis

Statistical analyses were conducted with SPSS version 23.0, with $p < 0.05$ considered to indicate significance. The Kolmogorov-Smirnov test was used to analyze the normal distribution of continuous data. The data are presented as the mean and SD, and categorical data are presented as proportions. The difference in QoL between NS pediatric patients in remission and relapse phases and healthy children was analyzed using an independent t-test. The correlation between illness duration and daily steroid dose with QoL was analyzed using the Pearson correlation test.

Results

Most of the NS pediatric patients and healthy children were male (68.2% and 63.6%, respectively), in the adolescent age group (68.2% and 81.8%, respectively), and not firstborn (70.5% and 65.9%, respectively). The average weight and height of the NS pediatric patients were lower than those of healthy children. Most of the patients with a clinical status of NS experienced relapse (63.6%), with an average illness duration of 16.55 months and a daily steroid dose consumed at enrollment of 31.73 mg. The participant characteristics are listed in Table 1.

Table 1. The basic characteristics of the participants.

Variable	Children aged 5–18 years	
	Nephrotic syndrome (n = 44)	Healthy (n = 44)
Sex, n (%)		
Male	30 (68.2)	28 (63.6)
Female	14 (31.8)	16 (36.4)
Age group, n (%)		
Children	14 (31.8%)	8 (18.2%)
Adolescent	30 (68.2%)	36 (81.8%)
Birth order, n(%)		
Firstborn	13 (29.5%)	15 (34.1%)
Not firstborn	31 (70.5%)	29 (65.9%)
Weight (kg), mean (SD)	38.59 (13.37)	40.59 (14.56)
Height (cm), mean (SD)	140.39 (16.96)	145.66 (16.29)
Clinical status of NS, n (%)		
Remission	16 (36.4)	-
Relapse	28 (63.6)	-
Illness duration (months), mean (SD)	16.55 (14.59)	-
Daily steroid dose at enrollment (mg), mean (SD)	31.73 (28.49)	-

The assessment of QoL between NS pediatric patients and healthy children according to the parent proxy report revealed significant differences in the school score ($p = 0.001$), whereas the physical, emotional, social, and total scores did not differ significantly. QoL differences according to the child proxy report were significant for the school and total scores ($p = 0.003$ and $p = 0.040$, respectively), whereas the other parameters did not show a significant difference (Table 2).

Table 2. QoL difference between the NS and HC groups according to the PedsQL™ 4.0 generic score scales.

Parameters	Parent proxy report		Children proxy report	
	Mean (SD)	P-value	Mean (SD)	P-value
Physical score				
NS	87.65 (14.26)	0.368	87.66 (14.25)	0.406
HC	90.00 (9.66)		89.93 (11.07)	
Emotional score				
NS	76.93 (16.22)	0.873	72.84 (15.97)	0.269
HC	76.36 (16.89)		76.82 (17.56)	
Social score				
NS	91.82 (11.57)	0.868	90.91 (12.82)	0.569
HC	92.77 (13.91)		92.39 (11.39)	
School score				
NS	68.29 (22.12)	0.001*	73.07 (19.48)	0.003*
HC	82.84 (15.53)		84.09 (13.57)	
Total score				
NS	81.19 (11.97)	0.067	81.14 (10.42)	0.040*
HC	85.38 (8.96)		85.82 (10.61)	

*Independent t-test.

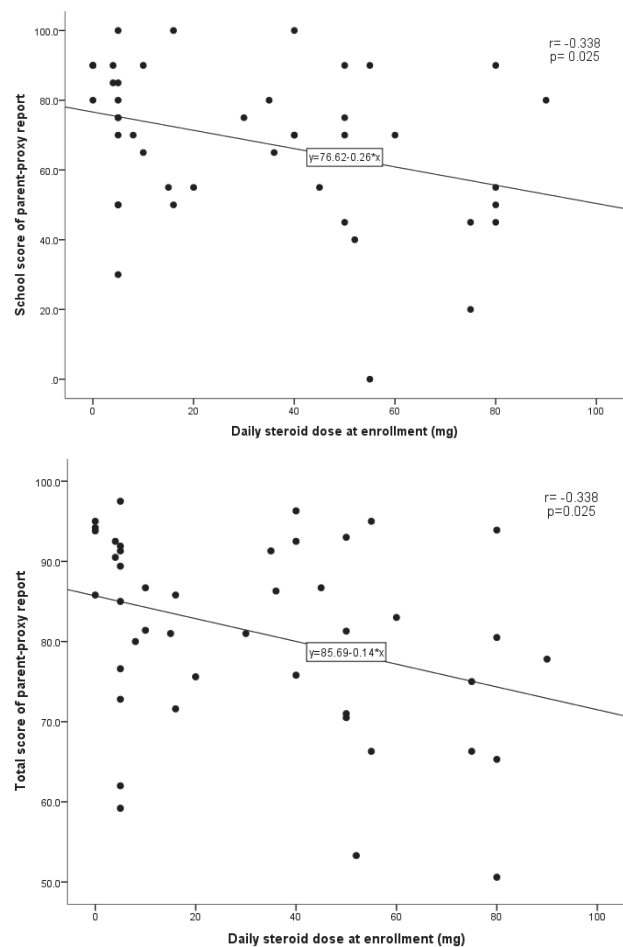
The QoL assessment of NS pediatric patients between remission and relapse phases using the parent-and-child proxy report revealed significant differences in the emotional score ($p = 0.019$ and $p = 0.030$, respectively). Conversely, no significant differences were observed in the physical, social, school, or total scores (Table 3).

Table 3. QoL difference according to NS pediatric patient clinical status.

Parameters	Remission Mean (SD)	Relapse Mean (SD)	P-value
Parent proxy report			
Physical score	89.46 (13.19)	86.62 (14.97)	0.531
Emotional score	83.75 (11.76)	73.04 (17.29)	0.019*
Social score	93.75 (9.04)	90.71 (12.82)	0.409
School score	68.13 (24.22)	68.39 (21.30)	0.970
Total score	83.79 (10.19)	79.70 (12.81)	0.280
Children proxy report			
Physical score	92.91 (9.40)	85.06 (15.97)	0.069
Emotional score	79.69 (15.33)	68.93 (15.24)	0.030*
Social score	91.25 (12.45)	90.71 (13.24)	0.896
School score	71.25 (23.77)	74.11 (16.95)	0.645
Total score	83.63 (10.05)	79.71 (10.54)	0.235

*Independent t-test.

The correlation between illness duration and QoL scores in the parent-and-child proxy report was not significant ($p > 0.05$) for all functions. A correlation existed between the daily steroid dose consumed at enrollment and QoL scores in the child proxy report for all functions ($p > 0.05$). Conversely, the parent proxy report revealed a significant negative correlation in the school and total scores ($r = -0.338$, $p = 0.025$; Fig. 1).

**Figure 1.** Correlation of daily steroid dose at enrollment with QoL.

Discussion

Most NS pediatric patients were male, with a ratio of 2:1. These results are consistent with those of several other studies (Eid et al. 2020; Mazahir et al. 2022). Currently, it is unclear why male children experience NS more frequently than female children. Most of the NS pediatric patients were in the adolescent group; this result is consistent with those of other studies (O. Pardede et al. 2019; Kartawijaya et al. 2022). Adolescence is an important human developmental stage, marked by puberty. The hormonal and immune changes that occur during puberty can affect kidney function and increase the risk of kidney disease. Most of the NS pediatric patients were not firstborn. Parents respond quickly and take their children to a health facility for treatment if they experience an illness that worries them. At the health facility, all data related to the child are recorded, including birth order.

The QoL assessment based on the parent report revealed a significant difference in school functioning between NS pediatric patients and healthy children ($p = 0.001$); however, no significant differences were found in the physical, emotional, social, or total scores. These results were inconsistent with those of studies conducted at Mansoura University Children's Hospital, Mesir (Eid et al. 2020) and the Children's Medical Centre, University of Medical Sciences, Iran (Abbasi et al. 2022). The difference in QoL scores between NS pediatric patients and healthy children in terms of physical, emotional, social, and total scores was small, whereas the scores for school functioning differed considerably, nearing 15 points. The parents of NS pediatric patients tend to be more protective regarding their child's health condition; thus, some of these parents opt for homeschooling, helping them monitor their child's activities and food consumption.

The QoL assessment using the child report revealed a significant difference in school functioning ($p = 0.003$) and total ($p = 0.040$) scores between NS pediatric patients and healthy children; however, no difference existed in the other functioning categories. This result is consistent with those of a study on health facility tertiary care in India; differences in QoL scores existed for physical, social, school, and total functioning in that study (Mazahir et al. 2022). The difference in QoL scores reached 11 points. Individually, NS pediatric patients have difficulty concentrating at school, often forget to do schoolwork, and often miss school because they feel unwell and visit the doctor for treatment.

NS pediatric patients often experience relapses; thus, the QoL in the remission phase can differ from that during relapse. The QoL assessments based on the parent and child reports showed significant differences in emotional functioning ($p = 0.019$ and $p = 0.030$, respectively), while other

functioning parameters did demonstrate differences. This result is inconsistent with that of a study conducted in Soba University Hospital, Khartoum, Sudan, which showed a significant difference in QoL in social, school, and total functioning (Allam et al. 2022). Emotional problems occur in NS pediatric patients; they often feel afraid, sad, and angry, struggle to sleep, and worry about their situation. This problem is related to steroid use, as the medication can affect emotions by increasing anxiety or irritability. Meanwhile, a relapse causes the children to experience emotional fluctuations, including despair and disappointment that the disease has not yet been completely cured.

Steroid use has been shown to affect QoL in the physical, emotional, social, and school functioning parameters (Khullar et al. 2021). In this study, a significant negative correlation existed between daily steroid dose and QoL, according to the parent report in school and total scores. Steroids can affect brain structure, particularly the areas involved in memory and attention. Structural changes in the brain can affect its ability to process information efficiently, interfering with the child's performance at school.

The limitations of this study are that the data were collected at one time point without follow-up, and the results obtained do not represent the populations in other cities or provinces. These limitations can be used as a basis for further research.

Conclusion

NS, a chronic pediatric kidney disease, can influence QoL. Parent and child reports revealed a significant difference in QoL in school scores between NS pediatric patients and healthy children. QoL differences were also observed in the emotional score between NS pediatric patients in remission and relapse. The daily steroid dose was negatively correlated with the school score in the parent proxy report. NS requires comprehensive management to improve QoL. Therefore, QoL assessments must be performed routinely every 3 to 6 months as part of NS pediatric patient management to assist in preventive and therapeutic measures.

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References

- Abbasi A, Valizadeh M, Fahimi D, Moghtaderi M, Bazargani B, Mojtahedi S Y, Fazel M, Hosseini-Asl SH, Raoofi E (2022) Health-related quality of life in Iranian children with nephrotic syndrome. *Iranian Journal of Pediatrics* 32(2): e11. <https://doi.org/10.5812/ijp-118426>
- Al-Radeef MY (2020) Association between allelic variations of -174G/C polymorphism of interleukin-6 gene and chronic kidney disease-mineral and bone disorder in iraqi patients. *Baghdad Science Journal* 17(4): 1145–1153. <https://doi.org/10.21123/bsj.2020.17.4.1145>

- Allam N, Bashar A, Eid R (2022) Assessment of health-related quality of life in Sudanese children with nephrotic syndrome: a questionnaire-based study. *Pan African Medical Journal* 43: 154. <https://doi.org/10.11604/pamj.2022.43.154.34980>
- Desai AD, Zhou C, Stanford S, Haaland W, Varni JW, Mangione-Smith RM (2014) Validity and responsiveness of the Pediatric Quality of Life Inventory (PedsQL) 4.0 generic core scales in the pediatric inpatient setting. *JAMA Pediatrics* 168(12): 1114–1121. <https://doi.org/10.1001/jamapediatrics.2014.1600>
- Eid R, Fathy AA, Hamdy N (2020) Health-related quality of life in Egyptian children with nephrotic syndrome. *Quality of Life Research* 29(8): 2185–2196. <https://doi.org/10.1007/s11136-020-02438-0>
- Falhi AK, Luaibi NM, Alsaedi AJ (2021) Hypothyroidism and Leptin in Iraqi patients with chronic kidney disease. *Baghdad Science Journal* 18(1): 1081–1085. [https://doi.org/10.21123/bsj.2021.18.2\(Suppl.\).1081](https://doi.org/10.21123/bsj.2021.18.2(Suppl.).1081)
- Haraldstad K, Wahl A, Andenæs R, Andersen JR, Andersen MH, Beisland E, Borge CR, Engebretsen E, Eisemann M, Halvorsrud L, Hanssen TA, Haugstvedt A, Haugland T, Johansen VA, Larsen MH, Løvereide L, Løyland B, Kvarme L G, Moons P, Norekvål TM, Ribu L, Rohde GE, Urstad KH, Helseth S, LIVSFORSK network (2019) A systematic review of quality of life research in medicine and health sciences. *Quality of Life Research* 28(10): 2641–2650. <https://doi.org/10.1007/s11136-019-02214-9>
- Hilmanto D, Mawardi F, Lestari AS, Widiasta A (2022) Disease-associated systemic complications in childhood nephrotic syndrome: A systematic review. *International Journal of Nephrology and Renovascular Disease* 15: 53–62. <https://doi.org/10.2147/IJNRD.S351053>
- Huang IC, Thompson LA, Chi YY, Knapp CA, Revicki DA, Seid M, Shenkman EA (2009) The linkage between pediatric quality of life and health conditions: Establishing clinically meaningful cutoff scores for the PedsQL. *Value in Health* 12(5): 773–781. <https://doi.org/10.1111/j.1524-4733.2008.00487.x>
- Kartawijaya AAP, Nugroho HW, Nur FT (2022) Quality of life in children with nephrotic syndrome at Dr. Moewardi Hospital. *Journal of Maternal and Child Health* 6(3): 344–352. <https://doi.org/10.26911/thejmch.2021.06.03.09>
- Khullar S, Banh T, Vasilevska-Ristovska J, Chanchlani R, Brooke J, Licht CPB, Reddon M, Radhakrishnan S, Piekut M, Langlois V, Aitken-Menezes K, Pearl RJ, Hebert D, Noone D, Parekh RS (2021) Impact of steroids and steroid-sparing agents on quality of life in children with nephrotic syndrome. *Pediatric Nephrology* 36(1): 93–102. <https://doi.org/10.1007/s00467-020-04684-3>
- Lee JM, Kronbichler A, Shin JI, Oh J (2020) Review on long-term non-renal complications of childhood nephrotic syndrome. *Acta Paediatrica* 109(3): 460–470. <https://doi.org/10.1111/apa.15035>
- Mazahir R, Anand K, Pruthi PK (2022) Quality of life in children with nephrotic syndrome: a cross-sectional study using Hindi version of PedsQL 4.0 Generic Core Scales. *Clinical and Experimental Nephrology* 26(6): 552–560. <https://doi.org/10.1007/s10157-022-02186-0>
- Pardede SO, Marsubrin PMT, Sekartini R, Munasir Z (2019) Quality of life of nephrotic children and its related factors. *American Journal of Clinical Medicine Research* 7(1): 31–36. <https://doi.org/10.12691/ajcmr-7-1-6>
- Ruslie RH, Darmadi D, Pakpahan C (2021) Health-related quality of life difference between early diagnose and finished therapy of nephrotic syndrome in children. *Open Access Macedonian Journal of Medical Sciences* 9: 801–805. <https://doi.org/10.3889/oamjms.2021.6601>
- Trihono PP, Alatas H, Tambunan T, Pardede SO (2016) Tata Laksana Sindrom Nefrotik Idiopatik Pada Anak. In: *Unit Kerja Koordinasi Nefrologi Ikatan Dokter Anak Indonesia Konsensus* (Ed. 2, Cetakan 2), 22 pp.
- Varni JW, Seid M, Kurtin PS (2001) PedsQL 4.0: reliability and validity of the Pediatric Quality of Life Inventory version 4.0 generic core scales in healthy and patient populations. *Medical Care* 39(8): 800–812. <https://doi.org/10.1097/00005650-200108000-00006>
- Varni JW, Burwinkle TM, Seid M (2005) The PedsQL™ as a pediatric patient-reported outcome: Reliability and validity of the PedsQL™ measurement model in 25,000 children. *Expert Review of Pharmacoeconomics and Outcomes Research* 5(6): 705–719. <https://doi.org/10.1586/14737167.5.6.705>