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ORIGINAL ARTICLE

Frequency of posterior cataract in steroid-dependent or frequent relapse nephrotic syndrome in children.

Kulsoom Shabbir[1], Misbah Anjum[2], Bilquis Naeem[3], Hira Urooj[4]

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ABSTRACT… Objective: To determine the frequency of posterior cataract in steroid-dependent or frequent relapse nephrotic syndrome (NS) in children presenting to National Institute of Child Health (NICH), Karachi. **Study Design:** Cross Sectional study. **Setting:** Department of Pediatrics, NICH, Karachi. **Period:** September 2022 to February 2023. **Material & Methods:** We enrolled children of both genders aged between 2 to 15 years with NS (frequent relapsing or steroid dependent) who were taking steroid for at least 6 months. Baseline demographic information of patients including age and gender along with duration of NS, duration of steroid treatment, present doses of steroid, and total cumulative dose of steroid were noted. Ophthalmological examination was carried out from ophthalmology department by slit lamp examination and the frequency of posterior cataract was noted. **Results:** In a total of 154 children, 84 (54.5%) were girls. The mean age was 3.41 ± 1.33 years. The most common presenting features/complaints were periorbital edema, fever and pedal edema reported in 112 (72.7%), 56 (36.4%) and 36 (23.4%) children respectively. The posterior cataract was found to be present among 23 (14.9%) children. Age ($p<0.001$), frequent relapse ($p=0.001$), increased duration of NS ($p<0.001$), duration of steroid treatment ($p<0.001$), number of relapses ($p<0.001$) and total cumulative dose of steroids ($p<0.001$) were significantly associated with posterior cataract. **Conclusion:** The frequency of posterior cataract among children having frequent relapse or steroid dependent nephrotic syndrome was 14.9%. Duration of nephrotic syndrome, duration of steroid treatment, number of relapses and cumulative steroid treatment dose were significantly linked with posterior cataract.

Key words: Cataract, Edema, Nephrotic Syndrome, Relapse, Steroid.

INTRODUCTION

Nephrotic syndrome (NS) is described by severe proteinuria that induces hypoalbuminemia progressing into hyperlipidemia, edema and other complications.[1] The NS results because of an aberration of glomerular permeability which may be linked to congenital infections, diabetes mellitus, systemic lupus erythematousus, neoplasia or with certain medications affecting renal functioning.[2,3] Nearly half of NS patients have an infectious condition episode, usually upper respiratory tract and 1/3rd of NS patients have some kinds of an allergic response, and less frequently have an insect bite, a vaccine, or medical stress.[4,5]

The NS is thought to affect two to seven new instances per 100,000 children under the age of 18 each year in healthy children.[6,7] African Americans and Hispanics are more likely to develop illness, and their symptoms are more severe.[8]

Systemic steroid medication has been linked to cataract development, according to studies.[9] It is estimated that 12.5-60% of individuals undergoing long-term oral corticosteroid treatment have reported developing cataracts.[10] Children who get long-term corticosteroid therapy are at an increased risk of developing cataracts.[10] Slit lamp biomicroscopy and a dilated fundus examination should be performed on nephrotic children receiving corticosteroid medication in order to look for cataract development and signs of elevated intraocular pressure (IOP).

1. MBBS, Post-graduate Resident Pediatrics, National Institute of Child Health, Karachi, Pakistan.
2. MBBS, FCPS (Pediatrics), Assistant Professor Pediatrics, National Institute of Child Health, Karachi, Pakistan.
3. MBBS, FCPS (Pediatrics), FCPS (Pediatric Nephrology), Assistant Professor Pediatric Nephrology, National Institute of Child Health, Karachi, Pakistan.
4. MBBS, Post-graduate Resident Pediatrics, National Institute of Child Health, Karachi, Pakistan.

Correspondence Address:
Dr. Kulsoom Shabbir
Department of Pediatrics
National Institute of Child Health, Karachi, Pakistan.
drkulsoomshabbir18@gmail.com

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In a study by Qureshi A, et al. has shown that frequency of posterior sub capsular cataract was 26.8% in steroid-dependent NS in children.[11] In another study by Gheissari A, et al. has shown that frequency of posterior cataract was 5.7% in steroid-dependent NS in children.[12]

To the best of our knowledge, only one local study[11] is available which demonstrated the frequency of posterior cataract in steroid-dependent NS in children. This research may help to investigate the impact of a significant side effect and gather data to support the potential use of alternative treatment methods for patients with NS. The goal is to reduce the reliance on prolonged steroid use, leading to improved management of NS and alleviation of treatment-related complications for patients. The objective of this study was to determine the frequency of posterior cataract in steroid-dependent or frequent relapse NS in children presenting to National Institute of Child Health, Karachi.

MATERIAL & METHODS

This cross sectional study was conducted at the department of pediatrics, National Institute of Child Health, Karachi, from September 2022 to February 2023. A sample size of 154 was calculated using 95% confidence level, 7% margin of error and prevalence posterior cataract of 26.8% in steroid-dependent or frequent relapses NS in children.[11] Approval from "Institutional Ethical Review Board" was acquired (IERB-14/2022, dated: 12-08-2022) for this research. Written and informed consents were sought from parents or guardians of all the children.

We included children of both genders aged between 2 to 15 years with NS frequent relapsing or steroid dependent NS who had taken steroid for at least 6 months. Children with history of zonular weakness or uniocular patients or those who refused to undergo ophthalmological examination were also excluded.

Baseline demographic information of patients including age and gender along with duration of NS, duration of steroid treatment, present doses of steroid, and total cumulative dose of steroid were noted. The NS was labeled as proteinuria more than (3.5g/24hr) or a urine protein: creatinine ratio > 2 and hypoalbuminemia (less than 2.5 gm/dl)/hyperlipidemia (cholesterol> 200mg/dl) on laboratory test. Steroid dependent NS was described as a relapse during steroid tapering or a relapse within 2 week of the discontinuation of therapy. Relapse was termed as a urine protein: creatinine ratio of > 2 or ≥ 3+ protein on urine dipstick testing for 3 consecutive days. Frequently relapsing was labeled as two or more relapses within 6 months after the initial therapy or four relapses in a 12-mo period. All children who had taken steroids for more than 6 months were sent to eye department. Ophthalmological examination was carried out by slit lamp examination performed by a consultant ophthalmologist with post-fellowship experience above 3 years. A cataract was labeled as any opacity of the lens discrete dots or white plaque-like opacities of the lens capsule. A special format was made to record study data.

All the data was analyzed using "Statistical Package for Social Sciences (SPSS)", version 26.0. Quantitative variables like age, duration of NS, duration of steroid treatment and weight (on weighing scale) were shown as mean and standard deviation. Gender and posterior cataract were described as frequency and percentages. Posterior cataract was stratified by age, duration of NS, duration of steroid treatment and weight. Post-stratification chi-square test was applied comparing qualitative data while quantitative variables were compared utilizing independent sample t-test, taking p ≤0.05 as statistically significant.

RESULTS

In a total of 154 children, 84 (54.5%) were girls and 70 (45.5%) boys. The mean age and body weight were 3.41±1.33 years and 14.85±2.43 kg. The mean duration of NS was 11.62±5.74 months while the mean duration of steroid treatment was 10.44±4.85 months. The mean present dose of steroids was 1.55±0.17 mg/kg/day while the mean cumulative dose of steroid was 6429.08±3048.39 mg. The most common presenting features/complaints were periorbital

edema, fever and pedal edema reported in 112 (72.7%), 56 (36.4%) and 36 (23.4%) children respectively. Frequent relapse NS was diagnosed among 71 (46.1%) children while 83 (53.9%) children were having steroid dependent NS (Table-I).

Characteristics		Frequency (%)
Gender	Boys	65 (42.2%)
	Girls	89 (57.8%)
Age (years)	2-5	144 (93.5%)
	5-12	10 (6.5%)
Presenting features/ complaints	Loose motions	62 (40.3%)
	Generalized edema	12 (7.8%)
	Respiratory distress	27 (17.5%)
	Periorbital edema	112 (72.7%)
	Fever	56 (36.4%)
	Abdominal pain	24 (15.6%)
	Pedal edema	36 (23.4%)
Diagnosis	Frequent relapse NS	71 (46.1%)
	Steroid dependent NS	83 (53.9%)

Table-I. Baseline demographic and clinical characteristics (n=154)

The posterior cataract was found to be present among 23 (14.9%) children as shown in Figure-1.

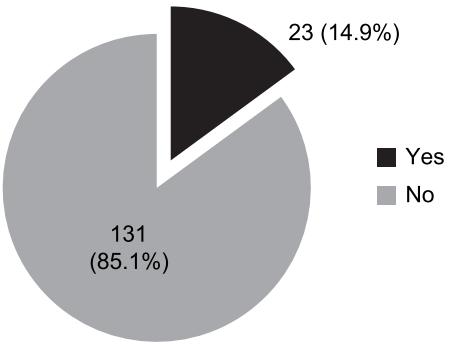

Figure-1. Frequency of posterior cataract among children with frequent relapse or steroid dependent NS (n=154)

It was found that age (p<0.001), frequent relapse (p=0.001), increased duration of NS (p<0.001), duration of steroid treatment (p<0.001), number of relapses (p<0.001) and total cumulative dose of steroids (p<0.001) showed significant association with posterior cataract (Table-II).

Demographic and Clinical Characteristics		Posterior Cataract		P-Value
		Yes (n=23)	No (n=131)	
Gender	Male	13 (56.5%)	52 (39.7%)	0.132
	Female	10 (43.5%)	79 (60.3%)	
Age (years)	2-5	11 (47.8%)	118 (86.3%)	<0.001
	5-12	12 (52.2%)	18 (13.7%)	
Presenting features/complaints	Loose motions	8 (34.8%)	54 (41.2%)	0.561
	Generalized edema	4 (17.4%)	8 (6.1%)	0.063
	Respiratory distress	3 (13.0%)	24 (18.3%)	0.539
	Periorbital edema	16 (69.6%)	96 (73.3%)	0.712
	Fever	12 (52.2%)	44 (33.6%)	0.087
	Abdominal pain	4 (17.4%)	20 (15.3%)	0.796
	Pedal edema	4 (17.4%)	32 (24.4%)	0.462
Diagnosis	Frequent relapse NS	18 (78.3%)	53 (40.5%0	0.001
	Steroid dependent NS	5 (21.7%)	78 (59.5%)	
Duration of NS (months)	Mean±SD	24.09±1.12	9.44±2.51	<0.001
Duration of steroid treatment (months)	Mean±SD	20.91±3.13	8.59±1.77	<0.001
Number of relapses	Mean±SD	4.91±1.0	2.11±0.81	<0.001
Present dose of steroid (mg/kg/day)	Mean±SD	1.53±0.13	1.55±0.17	0.519
Total cumulative dose of steroids (mg)	Mean±SD	11484±2782	5541±2076	<0.001

Table-II. Comparison of study variables with respect to frequency of posterior cataract among children with frequent relapse or steroid dependent NS (N=154)

DISCUSSION

Protein escapes from the circulation to the urine through the glomeruli in the NS, causing hypoproteinemia and widespread edema.[13] The mortality rates in NS has been lowered to about 3% because to corticosteroids.[14] The well-known and possibly dangerous side effects of corticosteroids include obesity, stunted development, posterior cataract, hypertension, diabetes mellitus, osteoporosis, and behavioral problems.

The present study was aimed to find out the frequency of posterior cataract among children having frequent relapse or steroid dependent NS and we found the frequency of posterior cataract to be 14.9%. Regional data by Gaur S et al revealed the frequency of posterior subcapsular cataract to be 26.8% which is higher than what we found.[15] A study done by Chaudhary GN et al from Dhaka Bangladesh found that 20% children with long-term steroid consumption had posterior subcapsular cataract.[16] A study done by Olonan LR et al revealed the frequency of posterior cataract as 13.6% in patients with NS which is very close to what we noted.[17] Hayasaka Y et al found the frequency of posterior cataract among patients of NS to be 33.3% which is above 2 folds that what we noted.[18] The variation in the frequency of posterior cataract among patients of NS could be credited to difference in factors like duration of NS, cumulative steroid doses and number of relapses. Ng JS et al[19] highlighted that significantly higher dose of steroid was linked with complication like cataract among patients of NS. We also noted that patients having posterior cataract had used significantly higher dose of steroids (11484±2782 mg vs. 5541±2076 mg, $p<0.001$). Some other researchers have also shown similar findings.[20] Grossman et al as well as Kaye and colleagues discovered no link between steroid treatment and ocular hypertension.[21,22] Our findings are consistent with Jezheela K et al who noted that there was a significantly linkage between the length of steroid medication and cataract development.[23]

In this study, higher age group had significant association with the frequency of posterior cataract. These findings are very similar to what Nakubulwa F et al found from Uganda recently.[24] According to Kobayashi et al and Brocklebank et al older children may have received therapy earlier and hence had more time to steroid treatment in comparison to relatively younger age group.[25,26]

Relatively small sample size, single center study place and a cross-sectional study design were some of the limitations of this study. We were unable to prospectively follow up enrolled children which could have given us more insight about the relationship of various aspects of NS and posterior cataract. There is a need to devise regular monitoring schedule for the children presenting with NS as early identification and treatment of acute as well as chronic complications of steroid dependent or frequently relapse NS children may improve overall outcome among these children.

CONCLUSION

The frequency of posterior cataract among children having frequent relapse or steroid dependent nephrotic syndrome was 14.9%. Duration of nephrotic syndrome, duration of steroid treatment, number of relapses and cumulative steroid treatment dose were significantly linked with posterior cataract. Regular ocular evaluation must be performed along with the assessment of other possible factors causing steroid induced ocular complications like posterior cataract among children having frequent relapse or steroid dependent nephrotic syndrome.

REFERENCES

1. Hill AJ, Stone DE, Elliott JP, Gerkin RD, Ingersoll M, Cook CR. **Management of nephrotic syndrome in the pregnant patient.** J Reprod Med. 2016; 61(11-12):557-61.

2. Raina R, Krishnappa V. **An update on LDL apheresis for nephrotic syndrome.** Pediatr Nephrol. 2019; 34(10):1655-69.

3. Dumas De La Roque C, Prezelin-Reydit M, Vermorel A, Lepreux S, Deminière C, Combe C, et al. **Idiopathic nephrotic syndrome: Characteristics and identification of prognostic factors.** J Clin Med. 2018; 7(9):265.

4. Dumas De La Roque C, Combe C, Rigothier C. **Up to date of pathophysiology mechanism of idiopathic nephrotic syndromes: Minimal change disease and focal and segmental glomerulosclerosis].** Nephrol Ther. 2018; 14(7):501-6.

5. McCloskey O, Maxwell AP. **Diagnosis and management of nephrotic syndrome.** Practitioner. 2017; 261(1801):11-5.

6. Vukojevic K, Raguz F, Saraga M, Filipovic N, Bocina I, Kero D, et al. **Glomeruli from patients with nephrin mutations show increased number of ciliated and poorly differentiated podocytes.** Acta Histochem. 2018; 120(8):748-56.

7. Esprit DH, Amin MS, Koratala A. **Uncommon things to note about a common cause of nephrotic syndrome.** Clin Case Rep. 2018; 6(8):1645-6.

8. Brkovic V, Milinkovic M, Kravljaca M, Lausevic M, Basta-Jovanovic G, Marković-Lipkovski J, et al. **Does the pathohistological pattern of renal biopsy change during time?** Pathol Res Pract. 2018; 214(10):1632-7.

9. Black RJ, Hill CL, Lester S, Dixon WG. **The association between systemic glucocorticoid use and the risk of cataract and glaucoma in patients with rheumatoid arthritis: A systematic review and meta-analysis.** PLoS One. 2016; 11(11):e0166468.

10. Mundell L, Lindemann R, Douglas J. **Monitoring long-term oral corticosteroids.** BMJ Open Qual. 2017; 6(2):e000209.

11. Qureshi A, Rasul T, Hashmi Z. **Frequency of complications after prolonged use of steroids in patients with nephrotic syndrome.** World J Pharm Med Res. 2020; 6(5):354-7.

12. Gheissari A, Attarzadeh H, Sharif H, Pourhossein M, Merrikhi A. **Steroid dependent and independent ocular findings in Iranian children with nephrotic syndrome.** Int J Prev Med. 2011; 2(4):264-8.

13. Rodriguez-Ballestas E, Reid-Adam J. **Nephrotic Syndrome.** Pediatr Rev. 2022; 43(2):87-99. doi:10.1542/pir.2020-001230

14. Hahn D, Hodson EM, Willis NS, Craig JC. **Corticosteroid therapy for nephrotic syndrome in children.** Cochrane Database Syst Rev. 2015; 2015(3):CD001533. doi:10.1002/14651858.CD001533.pub5

15. Gaur S, Joseph M, Nityanandam S, Subramanian S, Koshy AS, Vasudevan A, et al. **Ocular complications in children with nephrotic syndrome on long term oral steroids.** Indian J Pediatr. 2014; 81(7):680-683. doi:10.1007/s12098-014-1338-2.

16. Chaudhury GN, Khandoker T, Ferdous T, Chowdhury RA, Afroz S, Hanif M. **Ocular and extra-ocular complications following long-term steroid consumption in children with idiopathic nephrotic syndrome.** BIRDEM Med J. 2021; 11(1):7-10.

17. Olonan LRN, Pangilinan CAG, Yatco MM. **Steroid induced cataract and glaucoma in pediatric patients with nephrotic syndrome.** Phillip J Ophthal. 2009; 34(2):59-62.

18. Hayasaka Y, Hayasaka S, Matsukura H. **Ocular findings in Japanese children with nephrotic syndrome receiving prolonged cortico-steroid therapy.** Ophthalmologica. 2006; 220(3):181-5.

19. Ng JS, Wong W, Law RW, Hui J, Wong EN, Lam DS. **Ocular complications of paediatric patients with nephrotic syndrome.** Clin Experiment Ophthalmol. 2001; 29:239-43.

20. Mohan R, Muralidharan AR. **Steroid induced glaucoma and cataract.** Indian J Ophthalmol. 1989; 37(1):13-6.

21. Grossman BJ, Ozoa NF, De Benedetti C. **Intraocular-pressure changes in children with the use of corticosteroid therapy.** Proc Inst Med Chic. 1968; 27:55-56.

22. Kaye LD, Kalenak JW, Price RL, Cunningham R. **Ocular implications of long-term prednisone therapy in children.** J Pediatr Ophthalmol Strab. 1993; 30:142-144.

23. Jezeela K, Velayudhan DK, Chereyath R. **A Study on ocular finding in children with nephrotic syndrome.** J Evid Based Med Healthc. 2018; 5(11):1022-6.

24. Nakubulwa F, Lusobya RC, Batte A, Ssuna B, Nakanjako D, Nakiyingi L, et al. **Prevalence and predictors of ocular complications among children undergoing nephrotic syndrome treatment in a resource-limited setting.** BMC Ophthalmol. 2021; 21(1):55. doi:10.1186/s12886-021-01817-6

25. Kobayashi Y, Akaishi K, Nishio T, Kobayashi Y, Kimura Y. **Posterior subcapsular cataract in nephrotic children receiving steroid therapy.** Am J Dis Child. 1974; 128(5):671-673.

26. Brocklebank J, Harcourt R, SJ M. **Corticosteroid-induced cataracts in idiopathic nephrotic syndrome.** Arch Dis Child. 1982; 57(1):30-4.

AUTHORSHIP AND CONTRIBUTION DECLARATION

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Kulsoom Shabbir	Data collection, Drafting.	
2	Misbah Anjum	Critical revisions, Proof reading.	
3	Bilquis Naeem	Concept and designing, Responsible for data.	
4	Hira Urooj	Data analysis, Literature review.	