



Steroid Dependent and Steroid Independent Ocular Manifestations in Children with Nephrotic Syndrome on Long Term Steroid Therapy: A One Year Prospective Cross Sectional Study

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KEYWORDS

Nephrotic Syndrome, Corticosteroids , Ocular manifestations , Cataract, Glaucoma, Myopia , Periorbital Oedema

ABSTRACT:

Introduction: Nephrotic syndrome (NS) is a kidney disease seen in children aged 2 to 18 years. Prednisolone acetate is the most commonly used corticosteroid in the management of these children. The disease has a chronic, relapsing course requiring repeated, prolonged course of steroids. Long term steroid therapy is associated with ocular complications like cataract and glaucoma. Nephrotic syndrome may also show a few steroid independent ocular manifestations arising independently from the disease process.

Objectives: To study steroid dependent and steroid independent ocular manifestations in children with nephrotic syndrome on long term steroid therapy.

Methods: A hospital based prospective cross sectional study was conducted from August 2022 to July 2023 in the Departments of Ophthalmology and Paediatric Nephrology at KLES Dr Prabhakar Kore Hospital and Medical Research Centre, Belagavi after obtaining approval from Institutional Ethics Committee. The study was in accordance with the principles and tenets of the Declaration of Helsinki and written informed consent was obtained from all parents of included children. Sixty-one children aged 2-18 years with nephrotic syndrome on corticosteroid therapy were examined. Ocular assessment included visual acuity testing refraction, slit lamp bio microscopy , intraocular pressure measurement and fundus evaluation. The data obtained was statistically analysed.

Results: The mean age of children was 8.27 ± 3.58 years with male predominance (63.93%) . Steroid independent manifestations included eyelid oedema (37.7%) , blepharitis (3.28%) and refractive errors (22.95%) , with astigmatic myopia being the most frequent type. Steroid dependent manifestations were observed in 6.56% of children, all of whom presented with posterior subcapsular cataracts . None of the patients developed steroid induced glaucoma or hypertensive retinopathy.

Conclusions: Periorbital oedema and myopia were the most frequent steroid independent ocular findings , while posterior subcapsular cataract was the only steroid dependent manifestation seen in these children . Regular ophthalmologic evaluation is essential for early detection and management of ocular complications in children receiving long term corticosteroids therapy for nephrotic syndrome.

1. Introduction

Nephrotic syndrome (NS) is the kidney disease seen in children aged 2 to 18 years with incidence of approximately 2-3 cases per 1,00,000 population. It presents with massive proteinuria (40mg/m²/hour), hypoalbuminemia (< 2.5 gm/dl), hypercholesterolemia and oedema.⁽¹⁾ Several plasma proteins necessary for other metabolic functions are excreted in the urine in nephrotic syndrome leading to several complications. Patients with nephrotic syndrome are also at risk for fatal infections and thromboembolic episodes due to

significant loss of plasma proteins like albumin, coagulation factors and immunoglobulins.

Corticosteroids and sodium restriction are the mainstay in therapy for nephrotic syndrome. The disease has a chronic, relapsing course requiring repeated, prolonged course of steroid therapy. Nephrotic syndrome can lead to ocular complications like lid oedema , diminution of vision , hypertensive retinopathy and macular changes . Posterior subcapsular cataract , glaucoma , eyelid skin atrophy and recurrent hordeolum are steroid induced



ocular manifestations that can be seen in children with nephrotic syndrome.

All the children suffering from the nephrotic syndrome and are on long term treatment with corticosteroids must undergo timely examination by an ophthalmologist to rule out any ocular complications. Currently, there are few studies on the steroid dependent and steroid independent ocular manifestations in these nephrotic syndrome children. Therefore it is essential to study steroid dependent and steroid independent ocular manifestations in children undergoing long term steroid therapy for nephrotic syndrome.

2. Objective

To study steroid dependent and steroid independent ocular manifestations in children with nephrotic syndrome on long term steroid therapy.

3. Methods

This was a cross sectional study conducted at Departments of ophthalmology and Paediatric Nephrology, KLES Dr Prabhakar Kore Hospital and Medical Research Centre, Belagavi from August 2022 to July 2023. A total 61 children between 2-18 years of age diagnosed with nephrotic syndrome on long term corticosteroid therapy were included in the study. Children with presence of any other systemic disease with NS or any syndromic forms of NS and previous history of ocular trauma were excluded from the study.

The study was conducted after obtaining approval from Institutional Ethics Committee and all examinations were performed in accordance with the principles and tenets of the Declaration of Helsinki. Written informed consent was obtained from all parents of the children included in the study. A thorough medical history was obtained from the children and their parents, covering demographic information, the year when the condition first manifested, the course of therapy, any history of hypertension and any extra medications used were noted. Details of ocular symptoms like defective vision, headache, eyelid swelling and use of spectacles were taken.

Visual acuity, both distant and near vision was assessed with Snellen's chart and Jaeger's chart respectively. Best corrected visual acuity (BCVA) was obtained in all children. Objective wet retinoscopy

readings of both the eyes were taken using homatropine cycloplegic and subjective correction was given to the children having refractive error. Ocular alignment was checked by Hirschberg corneal reflex test and cover uncover test. Extraocular movements were examined in all cardinal directions of gaze. Detailed anterior segment evaluation was done by slit lamp examination. After dilating the pupil with mydriatics, slit lamp examination was repeated to look for posterior subcapsular cataract. Fundus examination was done by slit lamp biomicroscopy to look for glaucoma changes in disc. Intraocular pressure of both the eyes was measured by non-contact tonometer.

Data processing and statistical analysis:

R version 4.3.1 statistical tools and Microsoft Excel were used for data analysis. Categorical variables were represented by frequency tables. Continuous variables were presented in the form of Mean \pm SD / Median (Min, Max). The chi square test was used to examine if categorical variables were related. Shapiro Wilk test was used to check the normality of continuous variables. The parametric test was employed if the data had a normal distribution. Otherwise, non-parametric test was used. Two sample t test was used to compare the mean of variables over ocular manifestation. Mann Whitney U test was used to compare the distribution of variables over ocular manifestation. P-value of 0.05 or less denoted statistical significance.

4. Results

The present study included a total 61 subjects whose age ranged from 2 - 18 years with mean age of 8.27 ± 3.58 years. The majority of subjects (45.9%) were in the 6-10 years age group, followed by those aged over 10 years (27.87%) and those aged 2-5 years (26.23%). 39 (63.93%) of the 61 participants were boys, while 22 (36.07%) were girls.

The majority of subjects had excellent visual acuity, with 46 (75.41%) subjects achieving a visual acuity of 6/6 in both eyes. Additionally, 11 (18.03%) subjects had slightly lower but still good visual acuity ranging from 6/9 to 6/12 in both eyes. A smaller group of 4 (6.56%) subjects had visual acuity falling within the range of 6/18 to 6/24 in both eyes. Among the 61 subjects, 47 (77.05%) did not demonstrate any refractive errors, 8 (13.11%) had astigmatic myopia and 6 (9.84%) had simple myopia.



Totally, out of 61 subjects examined, 14 (22.95%) had refractive error.

Table 1: Subjects distribution based on refractive error.

Refractive error	Number of subjects (%)
Absent	47 (77.05%)
Simple myopia	6 (9.84%)
Hyperopia	0 (0%)
Astigmatic myopia	8 (13.11%)

On anterior segment examination, eyelid oedema was reported in 23 (37.7%) patients, blepharitis in 2 patients (3.28%), posterior subcapsular cataract was reported in 4 (6.56%) subjects. None of children had raised intra ocular pressure.

Table 2 : Type of ocular manifestations among children with nephrotic syndrome.

Ocular manifestations	Number of subjects (%)
Hypertrichosis	0 (0%)
Eyelid oedema	23 (37.7%)
Eyelid atrophy	0 (0%)
Ptosis	0 (0%)
Blepharitis	2 (3.28%)
Hordeolum	0 (0%)
Allergic conjunctivitis	0 (0%)
Keratitis	0 (0%)
Cataract	4 (6.56%)
Increased IOP	0 (0%)
Refractive error	14 (22.95%)
Hypertensive retinopathy	0 (0%)

Table 3: Steroid induced ocular manifestations among children with nephrotic syndrome.

Steroid induced ocular manifestations	Number of subjects(%)
Posterior subcapsular cataract	4(6.56%)
Glaucoma	0

5. Discussion

A total of 61 patients were enrolled in the study, between age group of 2 to 18 years. The majority 45.9% children were from 6-10 years of age group. The mean age was 8.27 ± 3.58 years. Nakubulwa et al observed in their study that most cases were from 7-12 years of age group with mean age of 7 years, which is similar to our study. ⁽²⁾ Another study done by Elsharkawy et al also showed mean age of 8 years. ⁽³⁾

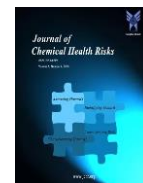
In present study, 39 (63.93%) were males and 22 (36.07%) were females. Toruan Y et al study showed male predominance of 60.9% in his study. ⁽⁴⁾ In the study done by Gaur et al it was observed that majority of the patients were male (73.2%) which is similar to our study. ⁽⁵⁾ But Nakubulwa et al observed female predominance in their study. ⁽²⁾

In our study, 22% children had myopia, among them 9.84% children had simple myopia and 13.11% had astigmatic myopia. Nakubulwa et al observed in his study that 56% of children had refractive error and 29% had astigmatic myopia. ⁽²⁾ According to findings of study done by Jezeela K et al, 20% of children had myopia with astigmatism and 12.9% had simple myopia. ⁽⁶⁾ The most commonly observed type of refractive error was astigmatic myopia in our study which was similar to other studies.

In our study, all children had intraocular pressure (IOP) between 10-21 mmHg with the majority of children having IOP between 14-17 mmHg which is within normal limit. Jezeela K et al observed in their study that 84% of the children were having IOP in the range of 10-14 mmHg, which is similar to our study and no patient had increased IOP which is similar to our study. ⁽¹⁰⁾ Chaudhury et al in their study found that 9.8 % of children had raised IOP. ⁽¹¹⁾

In our study, 62.3% children with nephrotic syndrome had steroid independent ocular manifestations which were eyelid oedema (37.7%), blepharitis(3.2%), myopia(22.95%). Other ocular manifestations like hypertrichosis, ptosis, eyelid atrophy, hordeolum, keratitis, allergic conjunctivitis were not found in our study.

In our study, majority of the patients (94.44%) had clear lens. 4 patients (6.56%) had cataract, which was steroid dependent ocular complication. Kulsoom et al observed



in their study that 14.9% of children had posterior subcapsular cataract. ⁽⁷⁾ Ghessari A et al observed 9.3% PSC in children with nephrotic syndrome in their study. ⁽⁸⁾ Joan SK et al found 10.3% of children had cataract in their study. ⁽⁹⁾ In the study done by Jezeela et al, it was found that 82.9% of children had clear lens and 15.7% had posterior subcapsular cataract in both eyes. ⁽⁶⁾ Hayasaka et al reported other steroid dependent ocular manifestations like elevated IOP, superficial punctate keratitis, conjunctivitis and hordeolum which were not observed in our study. ⁽¹²⁾ Nakubulwa et al also noted ocular findings like hypertrichosis, conjunctivitis, hordeolum, corneal scar in their study. ⁽²⁾

In our study, fundus examination was normal in all children. None of the children showed any disc changes suggestive of steroid induced glaucoma.

6. Conclusion

Periorbital oedema is the most common ocular manifestation seen in children with nephrotic syndrome children. Myopia is the most common type of refractive error seen in these children. Posterior subcapsular cataract is steroid dependent ocular manifestation seen in these children. None of the patients developed steroid induced glaucoma. All patients with nephrotic syndrome taking steroid therapy should have regular ophthalmological examination for early detection and prompt management of these steroid independent and dependent manifestations which would lead to better outcome.

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