

# Clinical Profile and Proportion of Children with Glaucoma and Glaucoma Suspect at a Tertiary Eye Care Center in Uttar Pradesh

Rizwan Ahmad Siddiqui<sup>1</sup>, Sadhavi Singh<sup>2</sup>, Suraj<sup>3</sup>, Akanksha Yadav<sup>4</sup>, Subhash Chandra Saroj<sup>5</sup>

<sup>1-5</sup>Resident, Department of Ophthalmology, Regional Institute of Ophthalmology Eye Hospital, Sitapur, India.

## Abstract

**Background:** A rare paediatric condition called paediatric glaucoma often results in severe vision loss. It consists of a variety of disorders that can be divided into primary, secondary, and acquired subtypes leading to optic neuropathy and visual field changes. To investigate the incidence and clinical features of paediatric glaucoma in a tertiary eye centre in Uttar Pradesh. **Subjects and Methods:** In this prospective and descriptive study, a total of 133 children aged 0 to 16 years who came to the clinic because of a diagnosis of glaucoma or suspicion of glaucoma were included. A detailed history of prenatal period, birth history including birth weight, birth trauma, delayed crying at birth, or hospitalisation for more than 48 hours was obtained. The comprehensive eye examination included visual acuity assessment, gonioscopy, intraocular pressure (IOP) measurement, and assessment of the anterior and posterior segments of the eye. **Results:** The majority of secondary glaucomas were those associated with traumatic glaucoma (56.52%), then those associated with acquired conditions like trauma and steroid-induced glaucoma (19.57%), ANRIDIA was 10.87%, Peters anomaly and Silicon oil induce glaucoma was 4.35%, angle recession and lens induce glaucoma was 2.17%, and finally those associated with acquired conditions like lens and angle recession induce glaucoma. The primary glaucoma, which made up 42.86% of all cases of juvenile glaucoma, was the most prevalent kind. The kids with glaucoma ranged in age from 0 to 16 years old. **Conclusion:** In this study, primary glaucoma, which accounted for 42.86% of all juvenile glaucoma cases, and secondary glaucomas were traumatic glaucomas (56.52%). Males were more commonly affected (73.24%), with a male-to-female ratio of 2.91.

**Keywords:** Primary congenital glaucoma.

**Corresponding Author:** Dr. Rizwan Ahmad Siddiqui, Resident, Department of Ophthalmology, Regional Institute of Ophthalmology Eye Hospital, Sitapur, India.  
Email: dr.rizwansufi@gmail.com

Received: 21 March 2023

Revised: 03 May 2023

Accepted: 18 May 2023

Published: 23 May 2023

## Introduction

Primary congenital glaucoma (PCG) and several acquired conditions belong to the broad category of childhood glaucomas. They can either affect only the eyes when they first appear, or they can be part of a disease affecting several other systems.<sup>[1]</sup> Worldwide, the diagnosis and treatment of glaucoma in children is a difficult problem. Early diagnosis and treatment are needed to prevent long-term visual impairment. However, it appears that they all follow the same path of pressure-induced ocular damage with possible blindness. The stage of presentation, confirmation of the glaucoma diagnosis and its aetiology, timing of intervention, and follow-up all affect the visual outcome of paediatric glaucoma.<sup>[2]</sup> Paediatric glaucoma has an incidence of 1:10,000 to 1:70,000 in Western countries, although it is more common in Saudi Arabia, southern India, and Slovakia, where it affects 1:250 to 1:3300 live births.<sup>[3]</sup> Because of the relatively low prevalence of infantile glaucoma and the associated lower awareness of the problem, there may be a delay in diagnosis and a corresponding decrease in the effectiveness of treatment.<sup>[4,5]</sup> Thus, a significant proportion of childhood blindness is caused by paediatric glaucoma, which accounts for 5% of

childhood blindness worldwide and has a prevalence of 18% in children living in institutions for the blind.<sup>[6]</sup>

Understanding the unique pattern of paediatric glaucoma in our region and defining our needs are essential steps in developing plans for future intervention. There should be a single, uniform classification method that is adopted by many professionals to provide a clear foundation. Although many classification methods have been developed, none is widely used.<sup>[7,8]</sup>

A single classification system based on clinical findings, timing, and context of glaucoma diagnosis was proposed by the Childhood Glaucoma Research Network (CGRN), an international consortium of glaucoma specialists. The group's goal was to create a clear and understandable categorization so that the majority of clinicians could decide on a systematic basis which category to place a condition in. These categories were used to group people with childhood glaucoma.<sup>[9]</sup>

It is not known what percentage of children receiving tertiary eye care in Uttar Pradesh have each glaucoma subtype. In a referral clinic, treatment options for paediatric glaucoma can be planned based on this information. The aim of this study is to investigate the incidence and clinical features of paediatric glaucoma in a tertiary eye centre in

Uttar Pradesh.

### Subjects and Methods

The Prospective longitudinal observational study was Before starting this prospective and descriptive study, we obtained approval from the ethics committee of our institution. This study was conducted in the Department of Ophthalmology, Sitapur, Uttar Pradesh, from April 2021 to March 2022. A total of 133 children aged 0 to 16 years who came to the clinic because of a diagnosis of glaucoma or suspected glaucoma were enrolled in the study. Informed consent was obtained from the guardians of all participants.

A detailed history of the prenatal period, such as medication use or fever with rashes, is obtained. Birth history includes birth weight, birth trauma, delayed crying at birth, or hospitalisation for more than 48 hours. A comprehensive family history was obtained, including consanguinity and the occurrence of similar complaints in family members. The comprehensive eye examination included assessment of visual acuity, gonioscopy, measurement of intraocular pressure (IOP), and assessment of the anterior and posterior segments of the eye. In nonverbal children, visual acuity was determined by a strong preference for one of the two eyes or resistance to occlusion of one of the two eyes or a test of preferred looking.

In verbally gifted children, visual acuity was determined using the Snellen chart or the Lea symbol chart or the E chart, depending on how cooperative and intelligible the child was. Intraocular pressure was measured with a Perkins tonometer under ketamine anaesthesia in noncooperative children and with a Goldman applanation tonometer in cooperative children. In scarred corneas, a rebound tonometer was used. A complete examination of the anterior segment of the eye with a slit lamp was performed. Assessment of the corneal disc was performed by direct ophthalmoscope or slit lamp biomicroscope. Horizontal and vertical corneal diameters were measured with a calliper under anaesthesia or with the slit lamp in cooperative children. In all cooperative children, perimetry was performed with the Humphrey Visual Field Analyzer. A general examination was performed to detect associations with specific syndromes. A paediatric reference will be obtained if needed.

#### Statistical Analysis

Descriptive statistics included mean and standard deviation for normally distributed variables and median with interquartile range (IQR) for non-normally distributed variables. Categorical variables were summarised as percentages. Pearson's chi-square test was used for proportions and one-way analysis of variance for means. All calculations and graphs were made using Microsoft Excel.

### Results

Table 1 shows the baseline characteristics of children with glaucoma patients. The percentage of age groups < 1 year, 1-4 years, 5-8 years, 9-12 years, and 13-16 years were

9.86%, 11.27%, 24.65%, 26.76%, and 27.46%, respectively. The percentages of male and female were 73.24% and 26.76%, respectively, with a male to female ratio of 2.91. The percentages of good vision (6/6-6/18), moderate vision (6/18-6/60), strong vision (< 6/60), and very strong vision (< 1/60) were 58.65%, 11.28%, 12.03%, and 18.05% in the right eye (OD) and 71.43%, 12.03%, 6.02%, and 10.53% in the left eye, respectively. The percentage of OD, OS, and OU laterality was 27.78%, 30.95%, and 39.68%, respectively, in children with glaucoma. The percentages of right eye, left eye in one eye, and both eyes were 20.43% and 22.58%; 28.49% and 28.49%, respectively.

**Table 1: Baseline characteristics of the patients**

| N=133               |             | n  | %     |
|---------------------|-------------|----|-------|
| Age (years)         | <1 year     | 14 | 9.86  |
|                     | 1-4 years   | 14 | 11.27 |
|                     | 5-8 years   | 31 | 24.65 |
|                     | 9-12 years  | 36 | 26.76 |
|                     | 13-16 years | 38 | 27.46 |
| Gender              | Male        | 99 | 73.24 |
|                     | Female      | 34 | 26.76 |
| Laterality          | OD          | 38 | 27.78 |
|                     | OS          | 42 | 30.95 |
|                     | OU          | 53 | 39.68 |
| UCVA (OD)           | 6/6-6/18    | 78 | 58.65 |
|                     | 6/18-6/60   | 15 | 11.28 |
|                     | <6/60       | 16 | 12.03 |
|                     | <1/60       | 24 | 18.05 |
| UCVA (OS)           | 6/6-6/18    | 95 | 71.43 |
|                     | 6/18-6/60   | 16 | 12.03 |
|                     | <6/60       | 8  | 6.02  |
|                     | <1/60       | 14 | 10.53 |
| No. of eye involved | OD          | 38 | 28.57 |
|                     | OS          | 42 | 31.58 |
|                     | Both OD+OS  | 53 | 39.85 |

The percentages of 0.2/1, 0.3/1, 0.4/1, 0.5/1, 0.6/1, 0.7/1, 0.8/1, and 0.9/1 cup ratio were 6.03%, 20.69%, 7.76%, 7.76%, 8.62%, 7.76%, 7.76%, 25.86%, and 7.76% at the right eye (OD) and 6.73%, 21.15%, 8.65%, 6.73%, 6.73%, 14.42%, 10.58%, 14.42%, and 10.58% at the left eye (OS), respectively [Table 2].

**Table 2: Cup disc ratio in children with glaucoma.**

|              | OD |       | OS |       |
|--------------|----|-------|----|-------|
|              | n  | %     | n  | %     |
| 0.2/1        | 7  | 6.03  | 7  | 6.73  |
| 0.3/1        | 24 | 20.69 | 22 | 21.15 |
| 0.4/1        | 9  | 7.76  | 9  | 8.65  |
| 0.5/1        | 9  | 7.76  | 7  | 6.73  |
| 0.6/1        | 10 | 8.62  | 7  | 6.73  |
| 0.7/1        | 9  | 7.76  | 15 | 14.42 |
| 0.8/1        | 9  | 7.76  | 11 | 10.58 |
| 0.9/1        | 30 | 25.86 | 15 | 14.42 |
| No/Hazy View | 9  | 7.76  | 11 | 10.58 |

Table 3 shows cup asymmetry > 0.2, focal rim loss, and HAAB striae in children with glaucoma. The percentage of cup disc asymmetry > 0.2, focal rim loss and OD, OS Haab's striae were 25.23%, 23.36%, 25.23% and 26.17%, respectively. Table 9 and Figure 9 show corneal diameter (mm) in children with glaucoma. The percentage of > 11 in neonates, > 12 in < at 1 year of age, and > 13 at any age

were 32.43%, 24.32%, and 43.24%, respectively. The frequency of presence or absence of reproducible visual field was 69.44% and 30.56%, respectively.

**Table 3: Cup disc asymmetry>0.2, focal rim loss and Haab, s Striaein children with glaucoma**

|                           |                 | n  | %     |
|---------------------------|-----------------|----|-------|
| Cup Disc Asymmetry >0.2   | Present         | 27 | 25.23 |
|                           | Absent          | 11 | 30.56 |
| Focal rim loss            | Present         | 25 | 23.36 |
| Haab's striae             | Present (OD)    | 27 | 25.23 |
|                           | Present (OS)    | 28 | 26.17 |
| Corneal Diameter (mm)     | >11 in new born | 12 | 32.43 |
|                           | >12 in <1y age  | 9  | 24.32 |
|                           | >13 in any age  | 16 | 43.24 |
| Reproducible Visual Field | Present         | 25 | 69.44 |
|                           | Absent          | 11 | 30.56 |

Table 4 shows the distribution of intraocular hypertension in the right eye (OD) and in the left eye (OS). Values are expressed as mean, median, ±SD, minimum, maximum, and interquartile range (IQR). The range of intraocular hypertension was 2 to 66 at OD and 8 to 50 at OS. Mean intraocular hypertension was 24.71±12.36 in OD and 24.92±10.57 in OS.

**Table 4: Intra ocular hypertensionin children with glaucoma**

| Intra Ocular Hypertension | Me an | Med ian | Std. Devia tion | Mini mum | Maxi mum | IQR |       |
|---------------------------|-------|---------|-----------------|----------|----------|-----|-------|
|                           |       |         |                 |          |          | 25  | 75    |
| OD                        | 24.71 | 24.00   | 12.36           | 2        | 66       | 14  | 30    |
| OS                        | 24.92 | 24.50   | 10.57           | 8        | 50       | 16  | 30.75 |

The percentage of Primary glaucoma, Secondary glaucoma and Glaucoma suspect were 42.86%, 34.59% and 22.56% respectively in the study population [Table 5].

**Table 5: Primary glaucoma, secondary glaucoma and glaucoma suspect**

| Types of Glaucoma  | n  | %     |
|--------------------|----|-------|
| Primary glaucoma   | 57 | 42.86 |
| Secondary glaucoma | 46 | 34.59 |
| Glaucoma suspect   | 30 | 22.56 |

Of the 57 cases, a total of 78.95% were congenital glaucomas and 21.05% were juvenile open-angle glaucomas in primary glaucoma; 10.87% of the cases were ANRIDIA, 2.17% of the cases were angle recession, 2.17% of the cases were Lens-induced glaucomas, 4.35% cases were Peters anomalies, 19.57% cases were steroid-induced glaucomas, 4.35% cases were silicone oil-induced glaucomas, and 56.52% cases were traumatic glaucomas in secondary glaucomas [Table 6].

**Table 6: Distribution of patients according to different types of diagnosis in primary and secondary glaucoma**

|                           | n=133                        | n  | %     |
|---------------------------|------------------------------|----|-------|
| Primary glaucoma (n=57)   | Congenital glaucoma          | 45 | 78.95 |
|                           | Juvenile Open Angle Glaucoma | 12 | 21.05 |
| Secondary glaucoma (n=46) | ANRIDIA                      | 5  | 10.87 |
|                           | angle recession              | 1  | 2.17  |
|                           | Lens induce glaucoma         | 1  | 2.17  |
|                           | Peters anomaly               | 2  | 4.35  |
|                           | Steroid induce glaucoma      | 9  | 19.57 |
|                           | Silicon oil induce glaucoma  | 2  | 4.35  |
|                           | Traumatic glaucoma           | 26 | 56.52 |

## Discussion

In this study, we characterize different glaucoma subtypes in children presenting to a tertiary ophthalmic institution with glaucoma, as well as their demographic and clinical features. Based on clinical symptoms, chronology, and context of glaucoma diagnosis, we classified glaucoma in children according to the categorization system developed by the Childhood Glaucoma Research Network (CGRN).<sup>[9]</sup>

During the study period, there were 133 new glaucoma cases in children (186 eyes). Of these, 42.86% were primary glaucomas, 34.59% were secondary glaucomas, and 22.56% were suspected glaucomas. Congenital glaucoma accounted for the majority of primary glaucoma (78.93%) and JOAG (21.05%) cases. Most secondary glaucomas were associated with traumatic glaucoma (56.52%), then those associated with acquired conditions such as trauma and steroid-induced glaucoma (19.57%), ANRIDIA was 10.87%, Peters anomaly and silicone oil-induced glaucoma was 4.35%, angle recession and lens-induced glaucoma was 2.17%, and finally those associated with acquired conditions such as lens and angle recession-induced glaucoma.

In our study, primary glaucoma was the most common type of glaucoma, accounting for 42.86% of all juvenile glaucoma cases. Similar to our analysis, primary congenital glaucoma was the most common type of glaucoma in childhood in various studies.<sup>[10-12]</sup> In published data, the prevalence of primary congenital glaucoma ranged from 19% to 47% and was bilateral in 62%-82% of cases.<sup>[2,7,10]</sup> In a study by Aponte et al, 63% of cases were acquired glaucoma.<sup>[2]</sup> In a study by Barsoum-Homsay et al, glaucoma was more common in participants with congenital anomalies (46%).<sup>[13]</sup> In a study by Fung et al, secondary glaucoma was the most common, accounting for 45% of cases.<sup>[2]</sup> Trauma and aphakia were the most common causes of glaucoma. In affluent countries, acquired glaucoma is more common than primary congenital glaucoma.<sup>[2]</sup>

The definitions of congenital glaucoma and JOAG used in the study varied, which could affect the proportion of children identified with these conditions. The age range for JOAG ranged from 3 to 16 years, and primary congenital glaucoma was classified as present at birth, up to 3 months, 1 year, or 3 years.<sup>[10-12]</sup> The primary congenital glaucoma occurring in infancy is the most common form of the

disease, followed by late-onset primary congenital glaucoma.<sup>[14]</sup> Neonatal primary congenital glaucoma was not present in any of the patients. However, in a study from India, primary congenital glaucoma with onset in infancy was the most common form.<sup>[13]</sup> In addition, JOAG accounted for 6.7% of primary paediatric glaucoma cases in this study, which is less than estimates from a retrospective study in India in which the condition accounted for 18.8% of all cases of primary childhood glaucoma.<sup>[2]</sup> A whitish appearance of the eyes was the most common symptom in the study population, and nearly three-quarters of the eyes studied had corneal opacities. In publications from Tanzania and Ghana,<sup>[5]</sup> the majority of patients with primary congenital glaucoma presented with severe disease and an opacified cornea. The present clinical picture is comparable to these cases. The loss of corneal transparency caused by stromal edema due to elevated IOP demonstrates the need for immediate treatment of primary congenital glaucoma. Because this can lead to sensory deprivation amblyopia, the resulting corneal scarring and chronic opacification may have implications for vision.<sup>[15]</sup>

In our study, the age of children with glaucoma ranged from 9 to 16 years (54.22%). According to Fung et al. (2013), patients with traumatic glaucoma tended to be older, while patients with congenital glaucoma tended to be younger (under 2 years of age) at diagnosis (between 10 and 15 years of age).<sup>[7]</sup> The median age at presentation of primary congenital glaucoma was three months and ten years for acquired glaucoma. In our study, most children with PCG (80%) showed their first symptoms at about 6 months of age.<sup>[16]</sup> Most studies show that children with primary congenital glaucoma often present between 3 months and 2 years of age.<sup>[102,123,124,125]</sup> In the British Infantile Glaucoma Study >, 50% of children of Asian descent had their first symptoms at 3 months of age, whereas 52% of Caucasian children did so by 6 months of age. Asian children with primary congenital glaucoma accounted for the majority of those admitted to the emergency department. The younger age of Asian children at diagnosis and self-report by parents may indicate a more severe course of the disease. Therefore, awareness is critical for early diagnosis and prompt referral by physicians. According to previous study, 55.6% of children with primary infantile glaucoma manifest glaucoma within the first year of life.<sup>[13]</sup> Another study from northern Tanzania found that 55.7% of those with primary infantile glaucoma were up to one year of age. In this study, the percentages of male and female were 73.24% and 26.76%, respectively, with a male-to-female ratio of 2.91. According to various studies, glaucoma frequently affects males.<sup>[17-19]</sup> Fung et al. (2013) Male patients accounted for 56% of the total population, with the highest percentage of male patients in trauma-related glaucoma (72%).<sup>[7]</sup> With a sex ratio of 2.32 to 1, patients with all types of glaucoma were more likely to be male. The prevalence of boys diagnosed with paediatric glaucoma was higher. According to other studies, most cases of secondary glaucoma associated with trauma were male patients.

Affected populations included those with 2.5:1 and 3:2 ratios, suggesting a higher proportion of male children.<sup>[7]</sup> In

contrast, a study found that the gender distribution did not change in children with PCG. Similar results were observed in certain groups.<sup>[16]</sup> The ratio between males and females is the same in both familial and consanguineous cases. Males were more frequently affected by secondary glaucomas than females, with a ratio of 2:1 for glaucomas after cataract surgery and 3.8:1 for acquired glaucomas (trauma and steroid-induced).

In this study, the proportions of OD, OS, and OU were 27.78%, 30.95%, and 39.68%, respectively. Moreover, the majority of patients (39.68%) were affected bilaterally. According to Senthil et al (2019), 85% of interactions were bilateral.<sup>[16]</sup> Several studies also found that 62% to 82% of individuals were bilateral.<sup>[7,16]</sup> Primary congenital glaucoma, the most common form of primary glaucoma in childhood, is typically bilateral and is thought to be caused by anomalies of the anterior chamber angle. The majority of the study population consisted of male patients, and the most common form was bilateral disease, which is also consistent with the Tanzanian study and previous findings on PCG forms from Turkey and Brazil.<sup>[17-19]</sup>

The mean intraocular pressure in our study was 24.71 12.36 in OD and 24.92 10.57 in OS. According to Fung et al. (2013), the average IOP was less than 21 mmHg in all groups.<sup>[7]</sup> According to the study by Obeidan et al. (2011), Saudi patients with PACG had a mean IOP of 29 mmHg, while the mean IOP in POAG was 27 mmHg.<sup>[20]</sup> The IOP was higher than 40 mmHg in 72% of eyes of glaucoma patients younger than 30 years.<sup>[21]</sup> Although 49% of glaucoma patients in Barbados were treated with medication, the average IOP in these individuals was lower at 27 mmHg.<sup>[22]</sup> We attributed the higher IOPs of patients with congenital glaucoma to their younger age and to the fact that they presented for initial examination without having previously received glaucoma medication. In addition, Tanzanians with gonioscopically proven open angles had an average IOP between 17.7 and 21.3 mmHg, according to Buhrmann et al. (2000). The JOAG group had the highest mean IOP (28.40 10.6 mm Hg).<sup>[16]</sup> The PCG group had the lowest post-treatment IOP (13.27 5.7 mm Hg), while the glaucoma group associated with congenital cataract surgery had the highest (21.26 9.38 mm Hg).

## Conclusion

This study provides population-based incidence rates for diagnosed childhood glaucoma. Of the 133 cases, 42.86% were primary glaucomas, 34.59% were secondary glaucomas, and 22.56% were suspected glaucomas. Primary glaucomas (42.86%) and secondary glaucomas associated with traumatic glaucoma (56.52%) were the most common. Children with glaucoma were between 9 and 16 years old (54.22%). Males were most commonly affected (73.24%). Corneal diameter (mm) > 11 in neonates, > 12 in < at 1 year of age, and > 13 at any age were 32.43%, 24.32%, and 43.24%, respectively.

## References

- Durnian JM, Cheeseman R, Kumar A, Raja V, Newman W, Chandna A. Childhood sight impairment: a 10-year picture. *Eye (Lond)*. 2010;24(1):112-7. doi: 10.1038/eye.2009.32, PMID 19247392.
- Aponte EP, Diehl N, Mohny BG. Incidence and clinical characteristics of childhood glaucoma: a population-based study. *Arch Ophthalmol*. 2010;128(4):478-82. doi: 10.1001/archophthalmol.2010.41, PMID 20385945.
- Aponte EP, Diehl N, Mohny BG. Incidence and clinical characteristics of childhood glaucoma: a population-based study. *Arch Ophthalmol*. 2010;128(4):478-82. doi: 10.1001/archophthalmol.2010.41, PMID 20385945.
- Ben-Zion I, Tomkins O, Moore DB, Helveston EM. Surgical results in the management of advanced primary congenital glaucoma in a rural pediatric population. *Ophthalmology*. 2011;118(2):231-5.e1-235. doi: 10.1016/j.ophtha.2010.02.027, PMID 20579739.
- Moore DB, Tomkins O, Ben-Zion I. A review of primary congenital glaucoma in the developing world. *Surv Ophthalmol*. 2013;58(3):278-85. doi: 10.1016/j.survophthal.2012.11.003, PMID 23465868.
- Gogate P, Kalua K, Courtright P. Blindness in childhood in developing countries: time for a reassessment? *PLOS Med*. 2009;6(12):e1000177. doi: 10.1371/journal.pmed.1000177, PMID 19997501.
- Fung DS, Roensch MA, Kooner KS, Cavanagh HD, Whitson JT. Epidemiology and characteristics of childhood glaucoma: results from the Dallas Glaucoma Registry. *Clin Ophthalmol*. 2013;7:1739-46. doi: 10.2147/OPTH.S45480, PMID 24039394.
- Yeung HH, Walton DS. Clinical classification of childhood glaucomas. *Arch Ophthalmol*. 2010;128(6):680-4. doi: 10.1001/archophthalmol.2010.96, PMID 20547943.
- Beck A, Chang TC, Freedman S. Definition, classification, differential diagnosis. In: Weinreb RN, Grajewski A, Papadopoulos M, Grigg J, Freedman S, editors. *Childhood glaucoma*. Amsterdam: Kugler Publications; 2013. p. 3-10.
- Papadopoulos M, Cable N, Rahi J, Khaw PT, Eye BIG, Study Investigators. The British Infantile and Childhood Glaucoma (BIG) eye study. *Invest Ophthalmol Vis Sci*. 2007;48(9):4100-6. doi: 10.1167/iovs.06-1350, PMID 17724193.
- Qiao CY, Wang LH, Tang X, Wang T, Yang DY, Wang NL. Epidemiology of hospitalized pediatric glaucoma patients in Beijing Tongren Hospital. *Chin Med J (Engl)*. 2009;122(10):1162-6. PMID 19493464.
- Fang Y, Long Q, Guo W, Sun X. Profile of pediatric glaucoma patients in Shanghai Eye, Ear, Nose and Throat Hospital. *Chin Med J (Engl)*. 2014;127(8):1429-33. PMID 24762583.
- Barsoum-Homsy M, Chevrette L. Incidence and prognosis of childhood glaucoma. A study of 63 cases. *Ophthalmology*. 1986;93(10):1323-7. doi: 10.1016/s0161-6420(86)33569-3, PMID 3785892.
- Mdala S, Zungu T, Manda C, Namate C, Fernando E, Twabi HS, et al. Profile of primary childhood glaucoma at a child eye health tertiary facility in Malawi. *BMC Ophthalmol*. 2022 Jan 31;22(1):45. doi: 10.1186/s12886-022-02279-0, PMID 35101025.
- Bermejo E, Martínez-Frías ML. Congenital eye malformations: clinical-epidemiological analysis of 1,124,654 consecutive births in Spain. *Am J Med Genet*. 1998;75(5):497-504. doi: 10.1002/(SICI)1096-8628(19980217)75:5<497::AID-AJMG8>3.0.CO;2-K, PMID 9489793.
- Senthil S, Badakere S, Ganesh J, Krishnamurthy R, Dikshit S, Choudhari N, et al. Profile of childhood glaucoma at a tertiary center in South India. *Indian J Ophthalmol*. 2019 Mar;67(3):358-65. doi: 10.4103/ijo.IJO\_786\_18, PMID 30777953.
- Fieß A, Godfrey F, Schuster AK, Bowman R, Philippin H. Referral patterns of children with glaucoma and their caretakers in northern Tanzania. *Int J Ophthalmol*. 2020;13(3):452-7. doi: 10.18240/ijo.2020.03.13, PMID 32309183.
- Tamçelik N, Atalay E, Bolukbasi S, Çapar O, Ozkok A. Demographic features of subjects with congenital glaucoma. *Indian J Ophthalmol*. 2014;62(5):565-9. doi: 10.4103/0301-4738.126988, PMID 24881602.
- Cronemberger S, Calixto N, Avellar Milhomens TGA, Gama PO, Milhomens EG, Rolim H, et al. Effect of intraocular pressure control on central corneal thickness, horizontal corneal diameter, and axial length in primary congenital glaucoma. *J AAPOS*. 2014;18(5):433-6. doi: 10.1016/j.jaaapos.2014.05.012, PMID 25439302.
- Quigley HA, Broman AT. The number of people with glaucoma worldwide in 2010 and 2020. *Br J Ophthalmol*. 2006;90(3):262-7. doi: 10.1136/bjo.2005.081224, PMID 16488940.
- Varma R, Wang D, Wu C, Francis BA, Nguyen BB, Chopra V, et al. Four-year incidence of open-angle glaucoma and ocular hypertension: the Los Angeles Latino Eye Study. *Am J Ophthalmol*. 2012;154(2):315-325.e1. doi: 10.1016/j.ajo.2012.02.014, PMID 22541649.
- Leske MC, Heijl A, Hyman L, Bengtsson B, Dong L, Yang Z, et al. Predictors of long-term progression in the early manifest glaucoma trial. *Ophthalmology*. 2007;114(11):1965-72. doi: 10.1016/j.ophtha.2007.03.016, PMID 17628686.

**Copyright:** © the author(s), 2023. It is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), which permits authors to retain ownership of the copyright for their content, and allow anyone to download, reuse, reprint, modify, distribute and/or copy the content as long as the original authors and source are cited.

**How to cite this article:** Siddiqui A R, Singh S, Suraj, Yadav A, Saroj C S. Clinical profile and proportion of children with glaucoma and glaucoma suspect at a tertiary eye care center in Uttar Pradesh. *Asian J. Med. Res.* 2023;12(2): 11-15.

DOI: [dx.doi.org/10.47009/ajmr.2023.12.2.3](https://doi.org/10.47009/ajmr.2023.12.2.3)

**Source of Support:** Nil, **Conflict of Interest:** None declared.